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THE WORLD SUGAR MARKET

Study by the UNCTAD secretariat

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INTRODUCTION

1. By virtue of its derivation from two distinct raw materials, sugar is produced under a wide range of climatic conditions in some 120 countries or territories, with sugar beet grown in temperate regions and sugar cane grown in tropical and sub-tropical regions. Sugar cane accounts for approximately 60 per cent of total production of centrifugal raw sugar (which accounts for virtually all of international sugar trade).

2. Sugar cane is a grass which grows widely in tropical and sub-tropical regions. It is a perennial crop, with a production cycle of five to seven years. Most producers are developing countries but sugar cane is also produced on a large scale in the United States, Australia and Japan. The European Union produces some, mainly in French overseas territories. Sugar beet, however, is an annual root crop which grows best in temperate regions. Most producers are developed countries; the only developing countries producing sugar beet on a large scale are China, Chile, Iran and Turkey.

3. The production of sugar from cane involves two stages. The first stage, cane growing and reaping, is a labour-intensive operation; the second - converting the cane into sugar - requires large investment outlays for the construction of factories and related infrastructure. It is also an industry with a high degree of specificity of factors. Land which is planted with sugar cannot be easily converted to other crops, and factories for milling or refining sugar have very few substitution possibilities.

4. The two main techniques for processing sugar cane are centrifugal and non-centrifugal processing. About one-sixth of developing country cane sugar is not centrifugally milled, but processed by the "open pan" method; the resulting sugars (with a variety of local names - panela in Latin America, gur in India, etc.) are consumed domestically (see annex I).

5. Most cane is milled with the centrifugal method yielding by a process of crystallization an impure brown sugar known as raw sugar. Raw sugar can be consumed directly, but most of it is processed into white sugar of varying qualities. Direct consumption of raw sugar accounts only for about 1 to 1.5 per cent of total world sugar consumption. In some countries, however, it plays an important role - in the Philippines for example, raw sugar accounts for about one-fifth of final consumption.

6. Raw sugar is used as the raw material to produce various types of white sugar (refined sugar and a variety of non-refined white sugars - crystals, plantation whites, washed whites), as well as so-called "special sugars". Non-refined white sugars are suited for human consumption and are traded internationally on a fairly large scale, albeit at a discount compared to refined sugar. "Special sugars" (such as Demerara and Golden Granulated) are also traded internationally, and inasmuch as they are destined to the health-food market, they normally command a considerable price premium compared to refined sugar. Unlike the processing of sugar cane, the beet sugar production process is designed in such a way as to yield refined sugar directly.

7. Sugar cane can produce several times more energy and fibre per hectare than any other crop. A good variety on good soils can yield 100 metric tons of cane per hectare. The processing of this cane produces 40-45 metric tons of food and

fibre on a dry basis, of which only about 10 metric tons is sugar (historically the primary concern). The principal by-products from sugar-cane processing are bagasse and molasses. About 19 different products can be made from bagasse, 16 from molasses, four from sugar and cane juice, four from filter press mud and five from cane and cane waste (see annexes II and III).

8. This indicates that the sugar cane industry is quite versatile, providing producing countries with a number of alternatives as regards the use of the sugar cane crop. The increased use of sugar cane by-products in animal feed and as fuel components can help broaden the production and export base of a country and make the sugar industry more resilient to fluctuations in world prices. As can be seen in annex IV, developing countries have been increasing the use of sugar cane by-products, although this area still has further potential.

9. The sugar market has experienced structural imbalances between supply and demand resulting in over-supply and price volatility. On the one hand, health concerns have contributed to reduced sugar consumption (and thus reduced demand) and to the development of alternative sweeteners. On the other hand, government policies have isolated most producers from world market price signals. Consequently, production has not reacted to reduced demand. This is discussed in chapter III. A further factor influencing the sugar market is the ownership structure of the companies producing and marketing sugar, which has an impact on price formation mechanisms (see chapters II and IV). Chapter V examines what Governments of both developed and developing countries can do to rebalance world sugar supply and demand and thus help to stabilize prices.

CHAPTER I

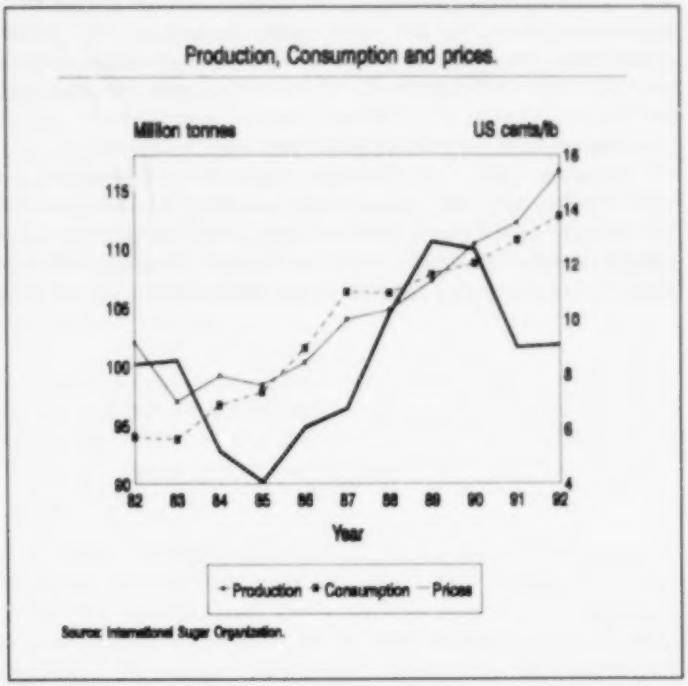
MAIN FEATURES OF THE SUGAR MARKET

10. During the 1980s, the sugar market was characterized by a situation of price instability and structural changes in international trade.

A. Supply and demand imbalances

11. During the 1980s, the sugar economy was in **oversupply**, with production exceeding consumption over the decade as a whole. Only the crop year 1980/1981 and the crop years 1986/1987 to 1988/1989 were deficit periods (see figure I). According to the International Sugar Organization (ISO), the crop cycle 1992/93 is likely to result in a sugar deficit of about 1.5 million metric tons; such a deficit is manageable for the market, and the estimated deficit therefore has not resulted in a significant price rise.[2] As a result of the oversupply between 1982 and 1992, stocks have been maintained at the high level of between 44 and 50 million metric tons, the latter representing 44 per cent of world sugar consumption in 1992.

Figure 1



12. The 1980s began with a world sugar price boom, prices of raw sugar reaching a short-term peak of 43 US cents per pound in October 1980, compared with a long term (1971-1990) average of around 10 US cents per pound. World production rose steeply as a result of the high prices and by the mid-1980s a large production capacity and stocks had been built up. This growth in production over the decade was overwhelmingly concentrated in importing countries (mainly China and India), and exceeded their consumption growth, thereby increasing their self-sufficiency ratio.

1. Factors affecting sugar demand

(a) Population and income in developing countries

13. In 1992 developing countries accounted for 59 per cent and developed countries for 41 per cent of sugar consumption. The overall per annum growth rate of sugar consumption in the period 1961-1991 was 2.6 per cent. In developing countries alone, however, it was 4.8 per cent, pointing to the fact that population size, which had grown considerably in developing countries, has

been a significant determinant of sugar consumption. Sugar is considered an important element in the dietary energy intake in these countries. The population growth in developing countries is expected to continue: it will account for virtually all of the increase in world population in the 1990s and beyond. An important intervening factor, however, will be income. As a FAO-ISO study on the prospects of the world sugar market for the 1990s points out, the level of world consumption in 2000 is significantly dependent on income growth. Under a high income-growth assumption (which appears to be more and more unrealistic), the annual overall growth rate of sugar consumption in the period 1990 to 2000 is predicted to be 1.94 per cent; under a low income growth assumption the figure is only 1.32 per cent.

(b) Health concerns and alternative sweeteners

14. A major factor which has led to reduced sugar consumption is concern about negative healuh effects and consequently competition from alternative sweeteners. Health regulations, government information campaigns concerning sugar and promotion campaigns undertaken by sweeteners producers have influenced consumers' attitudes towards sugar and encouraged substitution by alternative sweeteners. Health regulations are described in table 1.

Table 1
Health regulations

Country	Products authorized
USA	Saccharin, aspartame, and acesulfame-K are currently approved; cyclamate and cyclamate are under discussion. Alitame is awaiting FDA approval, and stevioside is forbidden.
European Union	Concerning "high intensity sweeteners", the main problem is that the rules differ from country to country. Since 1985, the EEC has tried to harmonize directives on sweeteners, particularly by introducing a list of intense sweeteners which should trade in the single market (acesulfame-K, aspartame, cyclamate, saccharin, thaumatin, neohesperidine DC). So far, however, different laws still prevail. For example, cyclamates are permitted for dietetic use in Denmark, Netherlands and Spain, but are forbidden in the United Kingdom, Belgium and France.
Japan	Aspartame, glycyrrhizinate, saccharin, thaumatin, stevia sweeteners are currently approved.
Canada	Aspartame, saccharin and sucralose are currently approved; cyclamate is also authorized but with certain restrictions. Soft drink producers are not allowed to replace all the sugar in soft drinks by HFCS.
Australia	Aspartame, inositol, sucralose, alitame, glycerin, xilitol, hydrogenated glucose syrup, glycerin, mannitol, thaumatin, acesulfame-K, xylitol, saccharin, cyclamate and sorbitol are all approved.
Stevioside is only permitted for use in some countries in Asia and Latin America. Aspartame and acesulfame-K are approved in every Eastern European country except Albania.	

15. Producers of alternative sweeteners make a case for the use of low caloric sweeteners as better for health, warning consumers against negative effects of excess sugar consumption. Sugar producers have reacted by undertaking publicity campaigns aimed at halting the erosion of sugar consumption, arguing that sugar is natural and not responsible for diseases. Such campaigns may have an impact

in countries where people are cautious about chemical and "non-natural" products.

Table 2
Country consumption of alternative sweeteners

Country	Consumption (million MT sugar equivalent)	Comments
USA 59.3*	HFCS : 5.60 Aspartame : 1.00 Saccharin : 1.70 Glucose : 2.30 Dextrose : 0.5	HFCS prices are about half of sugar prices. The HFCS market in the United States is close to saturation.
Japan 16.8*	HFCS : 3.78 Saccharin : 3.7 Steviosides : 3.02 Glucose : 3.74 Aspartame : 0.27 Dextrose : 0.13	Despite the fact that Japan is a maize importer and that HFCS is strongly taxed, its prices are below sugar prices. Growth of production has slowed down recently.
Republic of Korea 41.0*	HFCS : 0.9 Saccharin : 0.18 Aspartame : 0.012	Major producers of saccharin - around 2.5 million MT yearly - most of which is exported.
+ EU 21.7*	Glucose : 1.7 HFCS : 0.24 Aspartame : 0.30	HFCS production is subject to quotas. HFCS prices are 8-10 per cent above sugar prices. HFCS-55 is forbidden.
Canada 27.9*	HFCS : 0.21 Aspartame : 0.20	Most of HFCS produced is exported to the United States. Sugar prices are lower than HFCS prices.
China 12.4*	HFCS : 0.40 Saccharin : 3.0	As this country is a maize producer, HFCS development is expected to continue. For health reasons saccharin production is discouraged since 1990.
Argentina	HFCS : 0.15	HFCS production is subject to quotas. Production is below the quota levels due to low sugar prices.
Taiwan Province of China	HFCS : 0.1	
Percentage of alternative sweeteners in total consumption Source: UNCTAD data		

16. The most important caloric sweetener is High Fructose Corn Syrup (HFCS), which has made significant inroads, mainly in countries where domestic sugar prices are much higher than world prices. A different type, called low-caloric (high-intensity) sweeteners, boomed in the 1980s and may continue to do so in the 1990s.

17. In 1990, an estimated 18 per cent of world sweetener consumption was in the form of alternative sweeteners, up from 6.6 per cent in 1982. With 11.1 per cent of world consumption, caloric sweeteners, mainly HFCS, followed by glucose, accounted for the major part; low-caloric (high-intensity) sweeteners such as saccharin and aspartame accounted for the remainder. Annex V gives an overview of the main alternative sweeteners and their consumption.

18. Table 2 shows the role played by alternative sweeteners in the main consuming countries. While in the United States of America sugar has kept a share of just over 40 per cent of the sweetener market, in Canada and Japan its share is still around 60 per cent while in the European Union its share is close to 80 per cent. The reasons for the strong penetration of HFCS, especially in the United States market will be discussed later. China accounts for over half of world saccharin consumption; saccharin accounts for almost 30 per cent of China's (arguably low) total sweetener consumption. The main reason for this lies in the low costs of saccharin production.

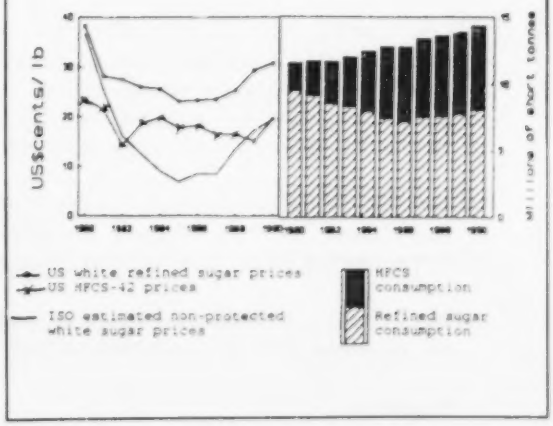
(i) Caloric sweeteners: the example of HFCS

19. HFCS is obtained from starch (from maize, rice, potatoes, cassava or other starch source). It was introduced in the 1960s. During the 1980s, growth of HFCS production and consumption was very fast. Currently, HFCS accounts for 7.1 per cent of world sweeteners consumption, with the United States of America consuming 72 per cent of the world total. As it is in liquid form, HFCS is used in particular in the soft drink industry (which in the United States accounts for over one-third of total caloric sweetener consumption). Since the decision in 1984 by Coca-Cola and Pepsi-Cola to use HFCS, instead of sugar, in their drinks, HFCS dominates this sector. The major HFCS markets (United States and Japan), however, seem to be close to saturation and HFCS expansion world-wide is slowing down.

20. HFCS consumption in most countries expanded behind a shield of import barriers and high domestic price support for beet and cane sugar. Figure 2 describes the situation in the United States. HFCS currently accounts for 40 per cent of the United States sweetener consumption, compared with 14 per cent in 1980, despite the fact that HFCS costs of production are generally higher than world sugar prices. In the United States, white sugar prices have been roughly 1.3 to 1.4 times higher than HFCS-55 prices and 1.5 to 1.7 times higher than HFCS-42 prices. In Japan, the other main HFCS consumer, white sugar prices are 1.9 times higher than HFCS-55 prices and 2.1 times higher than HFCS-42 prices. Unlike the Unied States and Japan, HFCS-42 prices in the European Union are slightly higher than white sugar prices.

Figure 2

Sugar and HFCS consumption and prices in the USA



21. Still, HFCS production is expected to expand in some countries in Asia, the European Union, Eastern Europe and in countries such as Mexico and Egypt. HFCS is now being produced in China, Indonesia, Malaysia, Pakistan, Philippines and Taiwan Province of China. These countries could increase their HFCS output in the future, particularly in areas where sugar is imported and maize or other starch sources are abundant. In the European Union, HFCS production is regulated by a system of quotas; however, with the current reform of agricultural policy, a growth of HFCS production is possible in the future, especially because the beverage sector

is very large. In Eastern Europe, small amounts of HFCS are already produced in Hungary and in the former Yugoslavia, and some investment projects are being evaluated in the CIS and Bulgaria.

22. Because of its liquid form, HFCS transport is expensive and requires good logistics. International trade is mainly limited to North America: Canada-United States-Mexico. In order to develop consumption of HFCS, countries have therefore to build their own HFCS industry. As investment costs for a HFCS-producing facility are high and storage of HFCS is complicated, the introduction/expansion of this industry may be difficult for most developing countries.

23. The GATT negotiations may have an impact in the future on this development: if the result is lower overall levels of protection, HFCS producers in countries such as the United States and Japan will suffer a loss of competitivity. In some other countries, however, with higher world market prices for sugar after liberalization, HFCS production may become more attractive. Overall, even if HFCS growth is still expected in some countries, its world market share is not expected to increase much further.

(ii) High-intensity sweeteners

24. From the discovery of saccharin in 1879 to that of aspartame in 1965, little happened in the area of high-intensity sweeteners. Today, following the success of aspartame, new low-caloric sweeteners are synthesized virtually every month. However, they are subjected to a long process of legal licensing in the United States, the main potential market. Aspartame came on the market 17 years after its invention while sucralose had to wait 15 years before obtaining regulatory approval.

25. New high-intensity sweeteners are being used more and more in developed countries, particularly in the United States and the European Union, with small amounts consumed in other countries. Developing countries, in general, have a low consumption of new high-intensity sweeteners. However, the situation is starting to change in these countries with the appearance of diet considerations and new fashions created by heavy advertising for "light" products. Nevertheless, given the importance of sugar in calorie supply in developing countries, low-calorie sweetener consumption is not expected to grow rapidly.

26. Several factors have contributed to the growth in demand for low-calorie sweeteners:

- Low costs, in particular for saccharin and cyclamate, with declining prices for aspartame and acesulfame-K. In terms of price, these products are increasingly competing with sugar. This may enhance their possibilities to expand in developing country markets, in particular in the soft drinks sector where HFCS has not yet replaced sugar.

- Health considerations, particularly connected to diabetics and dental problems. Dental caries according to the World Health Organization are "the world's second largest pathology";

- Diet-related considerations (popularity of weight-loss schemes), as well as prevention of cardiovascular diseases;

- Fashion;

- A diversity of features which allow processors to use low-caloric sweeteners fully adapted to their specific processing requirements.

27. Scientists have made remarkable progress in synthesizing new substitutes with additional advantages and suitability for low-cost production. Although, as indicated, these new products have to go through a long approval process, a strong growth of low caloric sweeteners production and consumption in developed countries may be expected.

2. Factors affecting sugar supply

28. The long-term slow-down of the growth of demand for sugar has not been accompanied by a similar evolution of supply. The failure of supply to adjust to demand over the long run in response to falling market prices has been due mainly to the following factors.

(a) Domestic protection policies

29. Domestic protection policies played a significant role in raising production in importing countries. For example, falling world sugar prices after the 1980 price boom led to the introduction in the United States of import quotas and the effective setting of a minimum domestic sugar price to protect the incomes of United States sugar producers. This domestic sugar programme fostered sugar production, which consequently rose at an average of 15 per cent over the decade. Meanwhile, the level of the internal prices enabled HFCS manufacturers to undercut substantially these prices, resulting in a sharp fall in United States sugar consumption and imports. (Domestic policies are discussed in detail in chapter IV).

Box 1

Is aspartame displacing sugar?

Since its introduction in 1982, aspartame has had much success in developed countries. Further growth can be expected. Since the NutraSweet patents recently expired, its price in the EC has halved. The two major producers, NutraSweet and H.P.C. both plan to double their production capacity, which will reinforce the drop in prices. As NutraSweet held the patent on aspartame in the United States only until 1987, the same drop is expected there. With lower prices, aspartame will become more attractive to consumers. Furthermore, a second generation of aspartame such as IFO Aspartame patented by IOM, T Aspartame II, manufactured by Ajinomoto, has been created with the purpose of overcoming some of aspartame's weak points. These products such as sweeteners 2000 (SHS) have been developed by NutraSweet and can be produced at very low costs. In the USA, an encapsulated version of aspartame, which can withstand high temperatures and thus be used in the important baking and confectionery industry, is already under petition. Another point in favour of aspartame is that in many countries the definition of what is "light" is being made more strict, which would result in more severe conditions as to the amount of calories allowed in "light" products.

The expected continued strong growth of the low-calorie market naturally worries sugar producers. It is therefore useful to see to what extent aspartame competes with sugar, and to what extent it merely expands the total sweetener market. Several studies suggest that the consumption of low-calorie sweeteners does not necessarily lower total sweetener consumption, partly because of reduced self control (the "diet coke" cum chocolate cake phenomenon) and partly because of physiological factors (a low blood sugar level increases hunger). For the USA market, for instance, no substitution of sugar by aspartame could be shown.

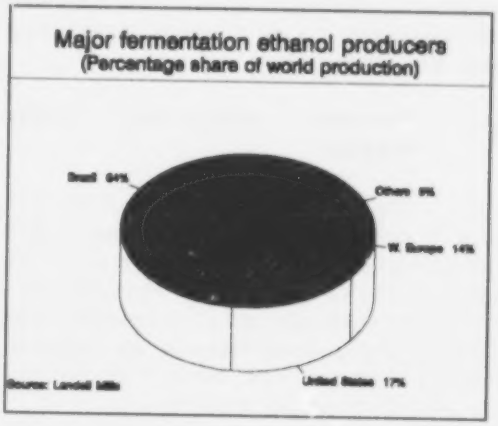
Nevertheless, it seems that to some extent the "light" fashion and publicity tend to change the sweeteners consumption structure to the benefit of aspartame and its derived products. However, a large part of the strongly promoted "light" products are in market segments where, during the 1980s, HFCS largely replaced sugar. Therefore, it is more likely that aspartame may displace HFCS rather than sugar, especially as new forms of aspartame will be very competitive with HFCS. Sectors such as the soft drink industry, which use relatively little sugar, may be very vulnerable to low aspartame prices. Some studies indicate that low calorie sweeteners, in particular aspartame, might capture one half of the soft drink market in the USA by 1995, compared to 27 per cent in 1990.

In conclusion, the offer of aspartame increases the total sweetener market and to the extent that it competes with other sweeteners, competes more with HFCS than with sugar.

(b) Price instability

30. Price instability has itself led to increased supply. The extreme price volatility on the world market (see the next section), for instance at the beginning of the 1980s (1980 was itself a peak price year and 1974 was still a fresh memory), may have made importing developing countries reluctant to satisfy an increasing share of rising consumer demand by imports, for fear of having to spend significantly more hard currency on imports, should there be another price rise. The solution thus was to foster domestic sugar production. The economic decline in many developing countries in the second half of the 1980s coincided with another upward phase in the world sugar price cycle. Although the peak prices of the period 1988 to 1990 were considerably lower than those of the previous two booms, they did represent a doubling of the pre-boom levels, which would have reinforced the judgement that reliance on imports makes a country vulnerable to the world price cycle. Many developing country importers, notably India and China, cut back imports in the late 1980s when prices rose. Both India and China took policy decisions to increase production and had achieved significant results by the beginning of the 1990s.

Figure 3



(c) Alternative uses of sugar cane

31. Sugar supply is influenced by the possibility for producers to divert sugar cane to the production of ethanol. This occurs depending on the prevailing oil/sugar price ratio. Ethanol is an input for the chemical industry and a potential fuel. Brazil has produced ethanol based on sugar cane since the 1930s (see Box II). Developed countries mainly produce ethanol from grain and crop residues.[1] Ethanol can either be a by-product of the sugar cane industry, obtained from sugar production by exploiting residual molasses, or an independent product obtained directly from sugar cane by distillation. Efforts by developing countries to use sugar cane for ethanol production increased after the first oil shock of 1973-1974. From the mid-1970s onwards, a number of oil-importing countries implemented intensive programmes for the production of anhydrous ethanol to be mixed with gasoline and used as a fuel; as a result, between 1977 and 1984 there was a seven-fold increase in world production of ethanol.

Table 3
World ethanol production
(million litres)

	1981	1985	1990
Europe	1 472	1 350	1 192
Asia	974	1 228	1 727
Africa	338	392	402
Oceania	85	90	97
United States	1 495	1 161	1 975
Latin America	4 241	8 752	14 050
TOTAL	8 595	14 979	21 443

Source: GEPLACEA, May 1992.

Box II

Brazil's Alcohol Programme

Brazil is by far the world's leader in ethanol production with 374 distilleries with a joint installed capacity estimated at between 15.2 and 16.4 billion litres (bl), producing in recent years 12.5 bl from 150 million tons of sugar cane. Of Brazil's 374 distilleries for producing fuel ethanol, 158 are annexed to sugar mills, allowing considerable flexibility in sugar cane use, and 216 are autonomous ethanol production units.

Influenced by the rise in world oil prices of 1974, Brazil launched the world's first major fuel ethanol programme in 1975, PROALCOOL. Drawing on the country's vast resources of land and rural labour and its highly favourable conditions for sugar cane growth, Brazil has more than doubled its sugar cane area and more than tripled its ethanol production from half a bl in 1975/76 to 12.7 bl in 1989/90.

The programme, however, ran into a number of difficulties. First, there were considerable problems in adapting cars and other vehicles to use sugar based alcohol instead of gasoline. Those problems were largely overcome by domestic car manufacturers, but so as to encourage the switch over from gasoline to gasohol the government was forced to subsidize the price of alcohol, making it substantially cheaper.

In 1989, export privatization and high world sugar prices led many millers, principally in the north/northeast, to forego ethanol production in favour of sugar. Brazil was obliged to import ethanol during 1989/90 and 1990/91, partly to rebuild its strategic reserve.

Once, once the price of oil started to fall, the cost of the consumer subsidy became increasingly burdensome. In 1989, the Government started to pull back from the ethanol programme by reducing the ethanol content of gasohol from 22 per cent to 18 and then 12 per cent; allowing pure ethanol fuel to be diluted by up to 5 per cent with gasoline; and reducing the price advantage that was given at the pump to ethanol over gasoline.

After the Gulf crisis the programme had a boost. Ethanol production for the period 1992/1993 was projected to increase to 13.2 billion litres. Given the sunk costs in the industry, shifting out of ethanol would be very costly, and the ethanol programme's future seems assured in the short term, with ethanol production likely to increase incrementally until it approaches Brazil's capacity of 15-16 bl.

Apart from having created an estimated 600,000 new jobs in the ethanol sector, Brazil has also invested much in alcohol-run cars, which in 1985 comprised more than 90 per cent of the new cars manufactured and sold in Brazil. This proportion slipped to 58 per cent in 1988 and 75 per cent in 1989 then to 15 per cent in 1990 and 1991 because consumers shied away from ethanol-powered cars after an ethanol fuel shortage in 1989-90. The programme is now being praised for its clean air aspects and therefore especially suitable for the urban areas of Sao Paulo and Rio de Janeiro. Ethanol reportedly produces 50 per cent less carbon monoxide than gasoline.

The development of Brazilian alcohol policy is of considerable interest to the world sugar market. If the alcohol policy is scaled back, the impact on sugar prices would be profound, as surplus cane would be channelled into the sugar market. Ethanol currently absorbs sugar cane sufficient to produce over 20 million metric tons of sugar, or more than two-thirds of world exports. With sugar milling capacity estimated at 12 million tons, Brazil would appear to be able to lift sugar production to that level, from recent levels of 8.5-9 million metric tons, by diverting 30-40 million metric tons of cane from ethanol. This overall makes Brazilian sugar exports a potential stabilizing factor in the world sugar market in the event of global shortages, although such a large adjustment is unlikely. Brazil needs to ensure the security of ethanol supplies to service its ethanol-dependent motor fleet. This, along with the long-standing commitment to satisfy domestic sugar needs, would curtail Brazil's ability to take advantage of higher sugar export prices. Nevertheless, the recent emergence of "methanol blends" presents an interesting new factor. If world sugar prices were to explode, Brazil could produce less hydrous ethanol and replace it with relatively cheap imported methanol (1 ton of imported methanol costs about $90 compared with $240 for imported ethanol). Cane originally ear-marked for ethanol could produce sugar for export.

32. As can be seen in Table 3, world ethanol production in 1990 totalled over 21 billion litres, with an average annual growth rate of 10.7 per cent during the decade between 1981-1991. A comparison by regions shows that Latin America had, with 14.2 per cent, the highest annual average increase; Brazil accounted for the highest share of world production (figure 3). The United States increased its output at an average rate of 11.5 per cent during the same period; other regions registered an average annual growth rate of 6.6 per cent in Asia, 2.3 per cent in Africa and 1.5 per cent in Oceania. Ethanol production showed a negative average annual growth rate of 2.3 per cent in Europe.

33. In 1990, some 40 per cent of European Union ethanol production was sold internally for use as fuel, 27 per cent was exported to Brazil, while around 22 per cent was exported to Caribbean countries for processing and re-exporting, mainly to the United States.

34. The main reason to produce ethanol is to reduce, on the one hand, dependence on expensive imported oil and, on the other hand, dependence on low or unstable prices for sugar on the world market. According to World Bank and the Sugarcane and Alcohol Producers' Cooperative of the State of Sao Paulo (Copersucar) estimates, the minimum crude oil import price needed to justify economically the use of sugar cane for ethanol production is US $ 30/barrel;[4] the actual figure differs somewhat from region to region, depending on the costs of sugar cane production and processing.[5] On this basis, ethanol production from sugar cane may be a viable proposition in some land-locked countries and regions with high oil transport costs. Ethanol is used to replace imported fuels in a number of African countries, including Tanzania and land-locked Malawi. Argentina and Paraguay in South America have also initiated fuel alcohol programmes. Eight more countries, some of which already produce ethanol from sugar cane for export purposes, are considering the possibility of including alcohol programmes in their national economic strategies: these are Bolivia, Costa Rica, El Salvador, Guatemala, Panama, Peru, Dominican Republic and Uruguay.

35. The environmental benefits of a fuel ethanol programme are significant since fuel ethanol does not contain any lead and, if burnt, its emissions of carbon monoxide, hydrocarbonates and nitrogen oxides are significantly lower than those produced by engines using gasoline only. According to estimates made by Volkswagen do Brazil, the production of ethanol in Brazil up to 1990 resulted in savings in the order of US $ 3.5 to 3.7 billion which would have been spent on anti-pollution devices for vehicles and on pollution-related investments in the oil refineries of the country.[6] Another environmental advantage of ethanol use is that, unlike oil derivatives, it does not aggravate the "greenhouse effect" since carbon dioxide released upon burning of the fuel is absorbed by sugar cane during its growth period.[7]

36. A second indirect benefit is the generation of income and employment. It is estimated that the production of ethanol in Brazil has generated approximately 700,000 direct jobs (in sugar cane plantations and alcohol distilleries), and about 200,000 indirect jobs (production of inputs and equipment for the sugar industry as well as the alcohol industry); in 254 of a total of 357 townships which had implemented alcohol projects, more than 10 per cent of the total labour force was employed in jobs generated by the production of alcohol. The introduction of alcohol production has helped to reduce the significant income disparities in the various regions of Brazil.

37. Brazil's move to use sugar cane to produce ethanol has reduced the pressure on the world sugar market. If Brazil were to shift even a part of its cane use to raw sugar production for the domestic or world market, prices would come under great pressure, to the detriment of a great number of Brazilian (and other) farmers. A multiple use of sugar cane has the advantage of allowing more flexibility for reacting to the variable sugar/oil price differentials. The gasohol blends used in conventional engines may be adjusted within certain proportions without engine damage - in Brazil, fuel blends have in the recent past contained between 12 to 22 per cent of alcohol, without much effect on engine performance. Even reducing the percentage by 4 per cent would already allow Brazil sufficient flexibility to put, in a very short term, over 700,000 metric tons of raw sugar on the world market if prices were sufficiently attractive.

B. Price instability

38. The imbalance between production and consumption has entrained strong price fluctuations. World market prices fluctuated between US 4 cents/pound in 1985 (a record low yearly average in real terms) and almost US 13 cents/pound in 1989 and 1990. The International Sugar Organization's monthly average price for raw sugar in 1992 was US 9.06 cents/pound.

39. Sugar price volatility has been greater than that for any other major commodity. The instability index calculated as the average percentage deviation of prices from their exponential trend was 58 per cent in the 1970s and 52 per cent in the 1980s.[4] This was double the figure for food (which was 29 and 21 percent in the respective years) and triple the figure for all commodities (which was 18.8 and 13 per cent in the respective years).

40. The main reasons for the instability of sugar free market prices included:

(a) The time lag between production decision and harvest. Sugar cane production has a cropping cycle of five to seven years; production decisions, if left to the market, have to be based on forecasts of future developments which in practice are often extrapolations of the recent past. If price expectations are high, for example, this leads to increased investment across the whole industry. At the end of the cropping cycle, supplies to the market increase substantially and prices drop accordingly if demand does not match the bigger supply. The opposite occurs if price expectations are low. Thus, it is obvious that synchronized production decisions based on expected prices amplify the price volatility in the market. Production forecasts for sugar are notoriously unreliable. In some countries, the gathering of data is not very well organized; in others, the Government tries to keep data secret as long as possible. New estimates can be radically different from estimates made only a short period before. The International Sugar Organization has been trying to increase transparency in the world sugar market, but there is still a lack of reliability in production forecasts.

(b) Sugar storage is difficult (raw sugar can only be stored for six to eight months, and in a tropical climate, refined sugar can be stored no longer than a few months); stocks cannot be used effectively to smooth out changes in production from year to year.

(c) The limited size of the free market for sugar and the various national systems of protection in place:

(i) The protection afforded by many countries, including the members of the European Union and the United States, to domestic sugar producers against world market competition, as indicated earlier and explained in more detail in chapter IV. The impact of these policies on price stability can be illustrated with the help of an example: in the European Union, the instrument to protect domestic producers (i.e. to shield them from the open market) is the variable import levy. If the production of sugar outside the Union increases, world market prices fall but this is not felt by its consumers, as the variable import levy brings up the lower world price to the domestic price. Therefore European buyers do not help to absorb the sugar surplus (i.e. increase their demand and thus stabilize the price) which they might do if prices reflected the lower world prices. The result is that, with such a system of variable levies in place, world prices fluctuate as an important part of consumers are shielded from those price signals and thus cannot contribute to the evening out of price fluctuations.

(ii) The international sugar market is only partly an open market inasmuch as sugar is traded under preferential arrangements where both prices and quantities delivered are more or less regulated (see chapter IV). The open market alone has therefore to absorb fluctuations in demand and supply; thus price volatility is higher than in a market where the effects of, for example, a production shortfall can be distributed more equally among all the buyers on the market.

41. Although, given the above factors, sugar prices are likely to remain very unstable in the short-run, some recent developments may lead to less volatility in the future. These include the greater price sensitivity of developing country importers (whose imports are also influenced by their overall financial situation), the increasing importance of free market trade and the strengthened exposure of both producers and consumers to world market price signals (enlarging the size of the market where world prices are formed).

C. Structural changes in international trade

1. Changes in geographical trade patterns

42. Figure 4 shows the main producers of centrifugal sugar and the changes in their shares of world production during the 1980s. Developing countries as a group increased their share in world production from 55 to 59 per cent, primarily as a result of a substantial increase in centrifugal sugar production in China, India, and Thailand.

43. Cuba, the European Union, Australia and Thailand accounted for almost 70 per cent of world exports in 1992. However, as can be seen from figure 5, during the 1980s, Cuba and the European Union decreased their shares in world exports respectively from 28 to 25 per cent and 15 to 13 per cent. In the case of Thailand, its share grew dramatically during the same period, from 7 per cent to 15 per cent. Brazil's share declined during the period, from 10 to 9 per

Figure 4

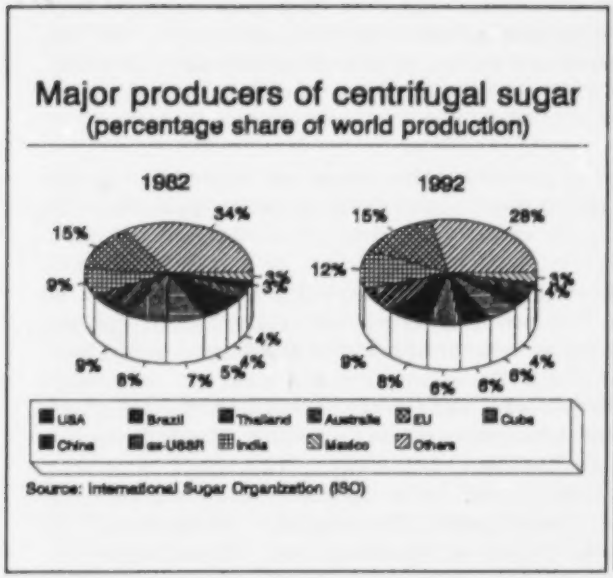


Figure 5

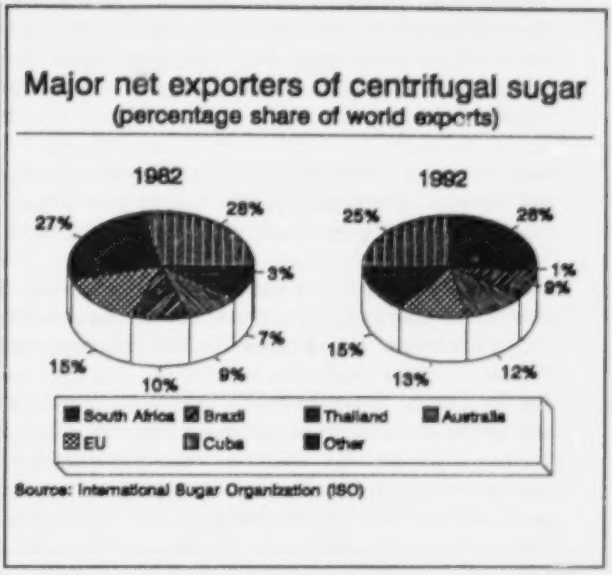


Figure 6

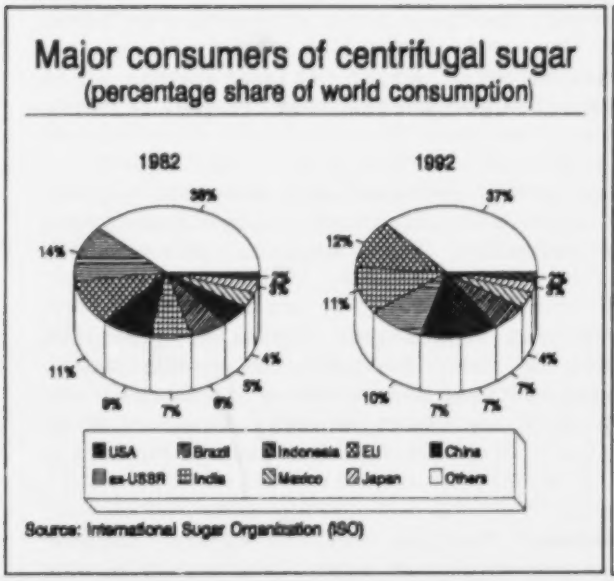
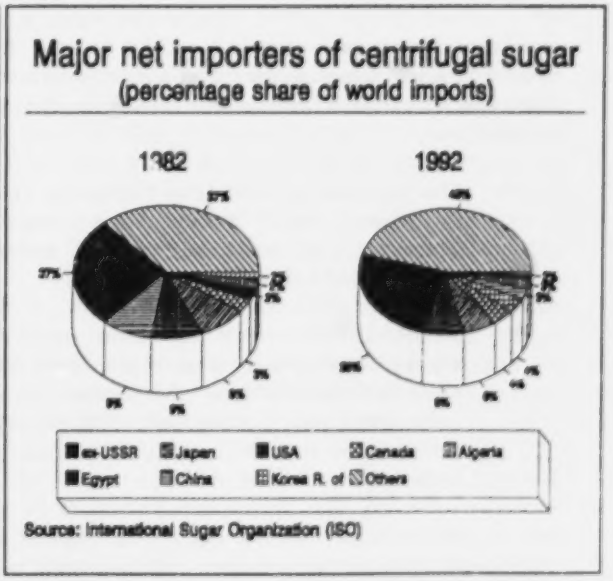


Figure 7



cent, partly reflecting its increased domestic use of sugar cane for ethanol production.

44. As can be seen from figure 6, the fastest growth in consumption in the 1980s was also in the Asian region, at an annual rate of 5.4 per cent. Asia accounted for virtually 70 per cent of the net growth in consumption. At the same time, consumption in developed countries fell by one million metric tons. Stagnating demand in developed countries has much to do with the competition from sugar substitutes.

45. With regard to world imports (see figure 7), the share of the three major importers (former USSR, United States and Japan) declined from 45 per cent to just over 30 per cent during the 1980s.

46. Developing countries as a group increased their share in world imports in the same period, from 44 to 57 per cent. At an individual country level, sugar imports have been erratic, depending upon the availability of domestic supplies. China, India and Mexico were major net importers in certain years. Although China has pursued a determined policy of self-sufficiency, consumption nevertheless increased quickly, preventing the plans from reaching their targets. In an attempt to reduce its dependency on the world market, China has acquired the technology to produce HFCS and saccharin, but this has not been sufficient to remove it from the list of major importers. In India, production of centrifugal sugar has closely followed the trend of consumption. Sporadically, however, supply and demand are unbalanced, which forces India to be a major player on the world market.

2. Changes in the volume and the commodity composition of the international sugar trade

47. Until the 1970s there had been a steady decline in the proportion of total sugar production entering world trade; by the early 1980s the proportion entering world trade had fallen to about one-quarter of total output; this share has since remained stable. Among the reasons for this low percentage, two are particularly significant:

- The drive for self-sufficiency (fostered by corresponding domestic support policies) has meant that most sugar-producing countries regard the domestic market as their main priority, with exports a secondary consideration.

- Since 1974, there has been an increased tendency in the major developed sugar-importing countries and regions (USA, European Union and Japan) towards increases in domestic production and towards reductions in consumption. Some developing country importers as well have tried to stimulate domestic sugar production - e.g. China, Indonesia, Pakistan, Sudan.

48. There has been a shift in import demand from raw to white sugar. Neither the capacity of raw sugar refineries nor the supply of white beet sugar by the main exporter, the European Union is likely to increase. White sugar accounted for almost 40 per cent of total world sugar trade in 1991, against 35 per cent in 1990, and around 30 per cent at the beginning of the 1980s. The shift in import demand from raw to white sugar is linked, on the one hand, to the shift in import demand towards developing countries which do not have the necessary

refinery facilities and, on the other hand, to the sharp decline in raw sugar imports by the United States.

49. This trend is expected to be reinforced in the 1990s with Russia shifting its import demand to white sugar. The reason for this is that most of the former USSR's raw sugar refining capacity was located in the Ukraine, while most of the demand for refined sugar occurs in Russia. It is not yet clear whether cooperation will be such that the Ukraine can continue refining raw sugar and providing white sugar for the entire Russian market.

50. In Asia, as well, the demand for white sugar is increasing. One reason for this is that distribution networks have improved considerably. This has reduced the relatively high transport risks for white sugar. For many years the transportation of large quantities of raw sugar in bulk carriers was the norm. In the last few years handling methods have become more sophisticated and costs have been sharply reduced, so that the movement of white sugar between regions and even over greater distances has become safer and financially viable.

51. Increasingly, producers are concentrating on the development of white end mills (which extend the cane processing procedure by directly converting the still molten raws into non-refined white sugars) with the result that cane refineries situated at the point of consumption and based on imported raw material will increasingly come under pressure. In consequence, there has been an increase in the trade of non-refined white sugars.

52. Developing countries accounted for 78 per cent of gross world white sugar imports, which in turn amount to 61 per cent of developing countries total gross imports. While white sugar is imported by a large number of countries, China, Republic of Korea and Malaysia alone accounted for 3.1 million metric tons (62 per cent) of a total of 5 million metric tons of raw sugar imported by developing countries in 1991.

53. Until now, the price differential between raw and white sugar has not been large enough to stimulate creation of refinery facilities (mainly in developing countries), or the use of surplus capacity (in the United States) in exporting countries, but this situation can change in the future. The major exporters of white sugar are the European Union (which supplies over half of total world exports), Brazil, Thailand (both with a share of about 7 per cent) and China (with a share of 6 per cent). The European Union exports only high-quality EEC No. 2 white sugar. Brazil exports mainly washed whites and plantation whites, while Thailand and China also export to a large extent white sugar other than EEC No. 2 quality. Because of the pressure on the white sugar market, these lower-quality whites can now be easier to sell: African countries, which in the past insisted on EEC No. 2 quality, now accept lower quality white sugar, e.g. Brazilian; the same is true for Egypt and Middle Eastern countries.

54. As the European Union has been the most consistent volume exporter of whites for many years, the market awaits with great interest its policy reforms which could reduce the level of surplus (and hence of exports) of white sugar and have a significant impact on the raw/white sugar price differential.

55. A considerable amount of white sugar, in total some 1 to 1.5 million metric tons, comes from toll-refining: the import of raw sugar which is then re-exported as white sugar. Toll-refining takes place in:

- United States, for Latin American and Caribbean countries;
- Republic of Korea and Malaysia, using mainly Australian raw sugar;
- China;
- India, following a recent policy decision to become a regular white sugar exporter;
- Singapore, mainly using Australian sugar;
- Egypt, when the white premium is high enough (which has not been the case in recent years);
- Brazil, using Cuban sugar and sugar delivered by two major private companies (Marc Rich and ED&F Man).

Countries such as the Republic of Korea, Malaysia and China have not only low refining costs, but also geographical advantages: Pakistan, for instance, buys its white sugar from these countries. Toll-refining will probably become even more important in the future.

CHAPTER II

GLOBAL OWNERSHIP STRUCTURES

A. Corporate structure of world production

56. Twenty-two companies (both private and state-owned) accounted for over one-third of world cane sugar production in 1991, and for two-thirds of beet sugar production outside of the CIS and Eastern Europe (see annex VI).

57. State enterprises control more than one-quarter of world sugar production. In general, most companies in developing countries are state-controlled. Government involvement in the sugar industry in both production and in domestic and international trading ranges from a complete monopoly, as in the case of Cuba, to various forms of ownership, as in the cases of China (where all mills are owned by governments), Indonesia (where the Government, through a number of plantations, controls 57 sugar mills out of Indonesia's 67) and Turkey (where the Government controls all 27 Turkish sugar beet factories through Turkiye Seker Fabrikalari A.S.).

58. The majority of the private companies are transnational in character. They have major interests in the industry world-wide either directly, through subsidiaries, or indirectly. The German company Südzucker, for example, owns about one-third of Germany's sugar factories and operates four sugar factories in Belgium. Ferruzzi Finanziara, an Italian company, controls sugar producing and marketing companies in Italy, France, Spain, and Uruguay. Tate & Lyle, the world's major private sugar producing company, with headquarters in the United Kingdom, manages, among many other activities in the sugar and sugar-substitutes sector, sugar estates in Ethiopia, Guyana, Jamaica, Kenya, Papua New Guinea, Ssi Lanka and Swaziland through one of its subsidiaries. During the late 1980s, some companies became increasing involved in Eastern Europe (possibly in preparation of a future expansion of the European Union); this was the case, among others, for Ferruzzi and Tate & Lyle, in Hungary, Sucden in Hungary and Romania, and Associated British Foods, in Poland.

59. There were significant developments in the corporate structure of the sugar industry, with several mergers and acquisitions taking place during the 1980s. This has led to increased industrial and commercial concentration. Associated British Foods, for example, acquired British Sugar from Berisford in 1991, after a take-over battle with Tate & Lyle and Ferruzzi Finanziara. Ferruzzi increased its share in Italian white sugar production from one-third to over half by taking over a number of independent mills. After taking over in the 1980s Canada's second largest sugar refiner, the largest refiner in the United States, a leading American beet producer and the second largest HFCS producer in the United States, Tate & Lyle then acquired in 1991 Bundaberg Sugar Company, Australia's largest cane grower. In 1992, the Canadian company BC Sugar took over its main competitor in Canada, which not only gave it control over two thirds of Canada's sugar production and refining, but also put it in control of the third largest refinery of the United States. In South Africa, the two dominant producers both strengthened their position in the early 1990s by taking over several of the remaining independent mills. Denmark's sole sugar producer, Danisco, took over Sweden's monopoly sugar producer in 1992, making it one of the world's largest sugar producers.

60. Through the acquisition of sugar mills and refineries in producing countries, many of these companies are now vertically integrated. Lonrho, for example, controls several plantations, mills and refineries in Africa. Major sugar companies such as Amstar (USA), Ferruzzi, and Tate & Lyle have entered the HFCS market. Ferruzzi is not only Europe's largest sugar producer, but also Europe's largest producer of sugar substitutes. Tate & Lyle is active at every stage of the sugar production chain and in the production of sugar substitutes. Its most significant investments were clearly oriented towards industrialized countries in the late 1980s: in the United States, the acquisition of Staley, the second-largest producer of corn syrup, and Amstar, the largest cane refiner. In Europe, Tate & Lyle increased its shares in Amylum (Belgium) and in other members of the Cereal Science and Technology Group; it also invested 44 million pounds in Campo Ebro (Spain), the second largest producer of HFCS in the European Union.

61. Some other large trading houses are also vertically integrated into production (Kuok Group in Malaysia, Booker Tate/Tate & Lyle in Tanzania, Kenya, Swaziland, Jamaica and Belize), the marketing in the country of origin (for instance the Group Sucres and Denrées through Amerop in Chile, and Czarnikow in Peru), and refining (a number of Japanese trade houses in Japan and Thailand, ED&F Man in Singapore). Large trading houses also play an important role in the sugar exporting sector in several producing developing countries. In certain producing countries, foreign ownership or foreign indirect management of local sugar production and export is quite significant.

62. Many of these companies are also integrated horizontally, mainly through an involvement in the food industry: Ferruzzi Finanziara's main field of activity, for instance, is edible oils; Associated British Foods, Danisco and Worms & Cie are well diversified in food production and associated services; a number of large sugar producers are mainly engaged in mining (CSR Ltd., Anglo-American Corporation, Barlow Rand Corp., and Lonrho).

B. World marketing structure

63. In 1991, twelve large producers' exporting companies accounted together for about 16 million metric tons of sugar exports, of which approximately 14 million metric tons consisted of raw sugar. Six companies accounted for close to one-third of world sugar imports.

64. In the case of raw sugar, the same producers accounted for 78 per cent of world raw sugar exports (see annex VII). Many of the 12 companies mentioned above are state-controlled and, as can be seen in table 4, bilateral government-to-government deals accounted for close to one-third of world raw sugar trade in the late 1980s. This concerns basically sales by Cuba, Australia and South Africa, all three of which have increased their production and exports, as well as sales by some smaller exporters such as Fiji. Prices in these government-to-government deals are either fixed prices (as in the case of Cuba), or reflect month-to-month market movements (eventually within a price band).

65. Close to 30 per cent of raw sugar is traded by brokers (see table 4). Some 10 per cent are exports by ACP countries to the European Union as compared with 18 per cent in the 1970s, which included operations under the Commonwealth Sugar Market Agreement, some brokerage operations towards the United States market and the French and Portuguese preferential markets. Most of these markets have declined or disappeared, except for the market regulated by the Sugar

Protocol of the Lomé Convention (EU/ACP). To reduce the problems linked to the predominance of one refining company (Tate & Lyle) among European Union raw sugar importers, the European Union made the use of brokers compulsory for these ACP exports. For more than 20 years, Tate and Lyle has bought most if not the whole of the preferentially imported sugar and has refined it in the United Kingdom (two refineries with a refinery capacity of 1.130 million metric tons white sugar equivalent yearly) and, since 1990, in Portugal (in a number of small Portuguese refineries, which it acquired that year). A small amount of sugar from former French colonies goes to French refineries.

Table 4
World marketing structures for white sugar
(in percentage shares)

	1970s	1980s
Government-to-Government	20	30
Brokered operations:		
- EU/ACP	34	34
- USA	19	10
- Producers to refiners	15	20
Trading houses:	47	40
- U.S. trade - Other trade	30 17	6 34
Total	100	100
Source: ISO statistics		

66. The other category of sales where brokers are used as intermediaries are direct sales from producers to refiners. These account for one-fifth of world raw sugar trade, basically consisting of sales to refiners in Canada, Malaysia and Japan.

67. Trade houses accounted for about 40 per cent of world tsade in raw sugar in the 1980s; however, in the United States sugar market, there has been a sharp reduction in the role of trading houses.

68. Trading structures in the market for white sugar differ considerably from those for raw sugar. The reason is that trade in the two forms of sugar occurs at different stages of the marketing chain: raw sugar is an unprocessed commodity sold to a small number of large processors. White sugar, on the other hand, is an end product, which can be sold directly to the many final consumers.

69. In the white sugar market, government-to-government deals accounted for only 6 per cent of the total trading volume while trading houses controlled about 90 per cent of world trade in white sugar in 1988-1990 (see table 5).

70. The role of trading houses has been strengthened by the emergence of a number of exporters who do not direct their sugar to any particular market. The European Union and countries such as Thailand and Brazil, as well as some smaller exporters from Central America, sell most of their sugar "omnibus", i.e. without fixed destination, which is a way of selling that is aimed at international trade houses. Sugar from Brazil, European Union and Thailand is also fairly standardized, which has resulted in a large second-hand market, with cargoes of sugar frequently changing hands among trade houses. This has considerably enhanced the flexibility of the sugar market.

Table 5
World Marketing structures for white sugar
(in percentage shares)

	1970s	1980s
Government-to-Government	20	6
Trading Houses	77	88
Border, transit	3	5
Total	100	100
Source: ISO statistics		

71. In the raw sugar trade, the number of trade houses is rather limited. Between four and five trade houses account for most of the volumes traded. In addition, some of them act as intermediaries in some of the other deals. One reason for the limited number of trade houses, and the concentration among them, is the fact that the United States market has shrunk and thus cannot support the activity of many trading houses; a second reason is low prices, which do not make raw sugar attractive to traders. In contrast, dozens of large trade houses deal in white sugar (see annex VIII).

72. All these factors (concentration, integration and internationalization) have contributed to strengthening the role played in the sugar industry by trading houses. Moreover, the traditional role of trading houses, i.e. taking advantage of differentials in prices and crop timing between sugar located in different areas and between sugar of different qualities, is still very important. To organize swap operations, which are in effect pre-export credits, is another activity of trade houses . An example is a deal with Cuba, with trade houses delivering sugar towards Cuba's contract commitments (which Cuba herself could not fulfil because of production shortfalls) in exchange for a certain amount of sugar of Cuba's next crops.

CHAPTER III

GOVERNMENT POLICIES IN THE SUGAR ECONOMY

73. Government intervention in sugar producing and consuming countries is a major factor influencing the world market for sugar. This intervention includes barriers to access to markets in the form of tariffs (see table 6), non-tariffs measures like quotas, wider policies of support to domestic producers in many countries, and the introduction of preferential arrangements which cover a significant portion of international trade.

Table 6
Nominal tariff rates applied in selected consuming countries on raw and white sugar

	EUROPEAN UNION		UNITED STATES		JAPAN		CHINA		CANADA	
	Type	Rate (%)	Type	Rate (%)	Type	Rate	Type	Rate	Type	Rate
Raw sugar	MFN-90 ACP-90	* 0.0#	MFN-90 GSP-90 CBI-90	0.0 0.0 0.0#	MFN-88 GSP	15cts/lb 0.0	GENERAL MFN-88	40.0 30.0	MFN-91 USA-91 CARIB-91	0.0 0.0 0.0
White sugar	MFN-90 ACP-90	* 0.0	GENERAL MFN-90 GSP-90 CBI-90	20.0 6.0 0.0 0.0	MFN-88 GSP LDC	10.0 5.0 0.0	GENERAL MFN-88	40.00 30.00	MFN-91 USA CARIB	0.0 0.0 0.0

* Import levies are set at a level which makes cost of imported sugar as high as internal prices.
# These zero-tariffs only apply to exports within country quota allocations; for exports exceeding quota, prohibitive import duties of 16 cts/lb are imposed.
Source: UNCTAD database.

A. Domestic support regimes

74. As shown in tables 10 and 11 (at the end of the chapter), major producing countries generally protect domestic producers by increasing the prices paid to them to levels above international prices. The protective regimes applied in the main markets, those of the European Union and the United States, are described in detail below. Japan also subsidizes its domestic sugar producers; its rates of subsidy are similar to those of the European Union and the Unites States. Similar protection policies prevail in a number of other countries, both developing and developed; examples are Côte d'Ivoire, India, Indonesia, Nigeria, Poland and Sweden. As a recent development, Russia is also considering the introduction of a 100 per cent customs duty on sugar imports to protect its own sugar industry and thus promote domestic production.[10]

75. Such protective regimes result in depressed sugar prices in the international markets. According to an UNCTAD study, world sugar prices would rise by 46 per cent in a scenario of 100 per cent liberalization and 9.2 per cent in a 20 per cent liberalization scenario, from 1986-1988 base period levels.[11] According to 1990 estimates by the United States Department of Agriculture,

liberalization of sugar production and trade would lead to an increase in the world sugar price of 10 to 30 per cent from its 1975-1989 long-run average level, and would reduce world price variability, albeit increasing domestic price variability in many industrial countries.[12]

76. A growing list of countries is moving towards liberalization and decreased government intervention. There is also a trend towards giving greater consideration to market forces in Argentina, Australia, Bangladesh, the Baltic countries, Brazil, Bulgaria, Canada, the Czech Republic, Egypt, Hungary, Israel, Mexico and New Zealand, Slovakia. Changes are also looming within the European Union, China and India, and on a smaller scale, in Chile, Morocco, Turkey and Venezuela. For the European Union, in particular, the CAP reform is likely to reduce the internal price support over time, against the background of trade negotiations under the Uruguay Round.

1. United States policy

77. Protection of sugar producers in the United States dates back to 1934. Since 1977, protection has been implemented through an internal price support system operated by the Commodity Credit Corporation (CCC) Loan Programme. Although the CCC was set up as a temporary measure, it has become the cornerstone of the United States sugar programme. The CCC is an agency of the United States Department of Agriculture, managing the funds from which most of USDA's programmes are financed. This is a system of loans to processors in order to support prices should these fall below certain predetermined levels. To obtain these preferential loans, processors must pay growers minimum prices, which are established annually for each region, and undertake to bear storage costs.

78. The Government establishes a loan rate for raw sugar which also serves to determine the loan rate for refined sugar. The Food Security Act of 1985 specifies the minimum national non-recourse [13] loan rate for sugar cane at 18 cents a pound for raw cane sugar (see table 8). The rate for beetsugar runs about 3 cents above the loan level for sugar cane.

79. Sugar is used as a collateral and processors can choose between:

- Repaying their loans to CCC, plus interest at a rate which is generally lower than that prevailing on financial markets;
- Forfeiting their sugar to the CCC: in this case they do not have to pay interest, but sugar passes into CCC's hands.

80. With the fluctuation of world market prices, much sugar was forfeited when prices were very depressed (for example, in early 1982). To minimize this risk, the Market Stabilization Price (MSP), a sort of target price, was introduced by the Government (in a 1981 Bill). The MSP represents a price for raw sugar at which commercial sales would be more profitable than forfeitures and therefore is deliberately set above the loan rate.

81. The only available tool to achieve the MSP is control over availability. USDA estimates domestic sugar demand and then uses a restrictive import quota to control the global supply (quotas will be discussed in detail below). Without the quotas, uncontrolled quantities of sugar would enter the United States market and domestic price would fall below the MSP. In consequence, sugar processors would forfeit their stocks to the CCC rather than sell them at a lower price on the market.

Table 7
US support prices and quota allocations
(in cents per pound and in thousand short tonnes, raw value)

Years	Loan rate (raw)	Transportation and handling costs	Interest	Other costs	MSP	Quota system
1981-82	16.75	1.63	0.00	0.20	19.08	0
1982-83	17.00	2.66	0.87	0.20	20.73	2,998
1983-84	17.50	2.62	0.85	0.20	21.17	3,009
1984-85	17.75	2.68	0.94	0.20	21.57	2.193
1985-86	18.00	2.51	0.79	0.20	21.50	1,839
1986-87	18.00	2.93	0.65	0.20	21.78	1,221
1987-88	18.00	2.96	0.60	0.20	21.76	874
1988-89	18.00	2.97	0.63	0.20	21.80	1,376
1989-90	18.00	3.04	0.71	0.20	21.95	2,125
1990-91	18.00	No new MSP				2,300
1991-92	18.00	No new MSP				1,725
Source: USDA						

82. However, imports cannot be reduced below the global quota, which is 1.25 million metric tons; this is why the Farm Act gave the Government an additional instrument, that is the possibility to restrict domestic production by imposing marketing allotments. A marketing allotment determines the quantity that can be sold by an individual enterprise in the United States domestic market at the first processing level. Producers must themselves find an outlet for surplus production (in 1992 some 300 to 400 metric tons), outside of the United States market.

83. The artificially high price for sugar has encouraged the development of sugar substitutes such as HFCS. If domestic sugar users had had access to sugar at international prices, this substitution process would have been less pronounced.

84. As the support for sugar producers takes the form of an enforced minimum market price, most of the cost of producer support has to be borne by consumers. The estimated cost to American consumers is US$ 1.4 billion a year.[14]

2. European Union policy

85. The European Union support policy is based on intervention prices set for raw sugar and white sugar. Prices are those at which intervention agencies in the Member States have the obligation to buy sugar from domestic producers within the limits of a quota. Coversely, sugar produced in excess of internal European

Union needs (this happens because intervention prices are well above world prices), but below the maximum quota receives export subsidies ("restitutions") to enable it to compete in world markets. A price similar to the intervention price is applied to raw sugar imported from ACP countries.

(a.) Production quota system

86. Production quotas were introduced in 1968. They are based on quantity produced, not surface cultivated. Quotas are set by country. Up to 10 per cent of quotas can, under certain conditions, be transferred between industries within a country; however, transfer between countries is not allowed.

Table 8
Quotas (A and B) and sugar production (A, B and C) by country, 1991
(1,000 metric tons, white value)

Country	A-quota	A-sugar production	B-quota	B-sugar production	C-sugar production
Belgium/Luxembourg	680	680	146	146	138
Denmark	328	328	97	97	43
France - mainland -,territories	2 560 436	2 560 250	759 47	759 -	1 124
Germany	2 638	2 638	812	804	626
Greece	290	241	29	-	-
Ireland	182	182	18	18	29
Italy	1 320	1 320	248	235	116
Netherlands	690	690	182	182	254
Portugal	64	1	6	-	-
Spain	960	960	40	40	10
United Kingdom	1 040	1 040	104	104	148

There are three kinds of quotas:

- The A quota (also called basic quota) is the production needed to match estimated domestic consumption. National quotas are set through negotiations, taking into account levels of self-sufficiency in each country. Governments allocate the A quota to processors who apportion it among growers in the form of contracts.

- The B quota is a security margin for any additional consumption. A and B quotas make up the maximum quota. The B quota was formerly a percentage of the A quota, and rates differed among European countries. This percentage used to be reviewed annually, but not necessarily changed. Now, both A and B quotas are set for a five-year period; the B quota is a fixed quantity of 2.288 million metric tons. Any A and B sugar in excess of consumption is exported with export refunds.

* The C quota (or C sugar) is the production in excess of the maximum quota and is not directly covered by the price support system. There are no limitations on this production. However, except in times of shortage, C sugar may not be sold among the Member States. It has to be sold on the world market at the growers' risk. C-quota exports are large: in 1991/92, some 1.384 million metric tons of white sugar were exported without refund, as against 2,808 million metric tons with refund. Farmers produce C sugar for several reasons:

  - Farmers produce more than the allocated quotas to make sure that in the case of a production shortfall they would still meet their quota target. A factory's quota may be reduced if it does not fulfil it.

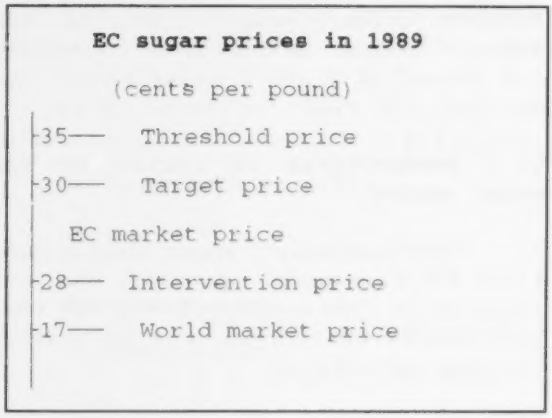
  - If farmers expect world prices which are higher than the intervention price, they raise their production above the A and B quotas.

A and B quotas have been reduced over the years. They were last reduced in 1981/82, by 1.76 per cent on an European average.

(b.) The European Union sugar price policy

87. European Union sugar prices are highly regulated. Each year, a target price for white sugar is fixed by its Council of Ministers, on the basis of production costs for a standard quality of sugar in the most efficient area, which is the north of France. This target price is implemented by setting a minimum import price (threshold price) at a higher level and an intervention price for white and raw sugar at a lower level. Intervention prices are regionally differentiated, reflecting regional cost differences: higher-cost producers thus receive a higher price. (See figures 8 and 9)

Figure 8



88. In most years, intervention prices are well above CIF world market prices (except for 1974/75 and 1980/81 - see figure 10). As indicated, sugar produced in excess of internal European Union needs, but below the maximum A and B quotas, receives export restitutions so as to be competitive with world market sugar. These subsidies, paid out of the guarantee section of the European Union's Agricultural Guarantee and Guidance Fund (EAGGF), are based on the difference between the intervention price and the CIF world market price. As a result, intervention agencies, in practice, purchase very little sugar.

89. With the system set up, the European Union is almost completely closed off from the world market. Imports are taxed at the border by variable levies, which are equal to the difference between the minimum import price (threshold price) and the CIF price ('world price'). For this reason, free market imports have been absent in recent years.

90. Two different types of levies are collected from producers and processors. It has to be pointed out that these levies pay entirely for the disposal cost of all production surpluses. First, a storage levy is collected from processors to pay for storage costs. ACP exporters also pay this storage levy. Secondly, A and B quota producers bear a production levy of 2 per cent and up to 37.5 per cent respectively to finance industry support arrangements. In periods of sugar budget deficits, an additional levy (called a resorption or elimination levy) can be imposed, as was the case in the period 1985/86 to 1990/91. This levy, too, only weighs on A and B production, with beet (and cane) growers paying some 60 per cent and processors the remainder. The consequence is that, even though only B-sugar exports are subsidized by the European Union, C-sugar production and exports remain attractive. Actually the spread of B and C sugar prices has not been far apart in recent years.

Figure 9

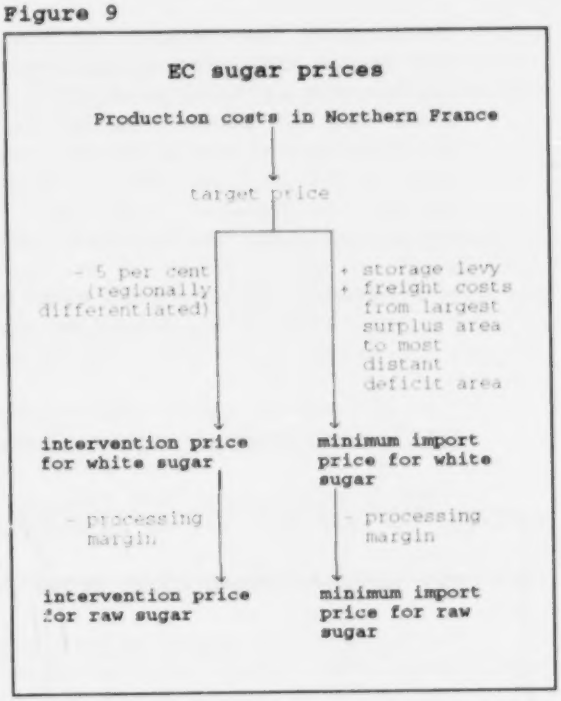
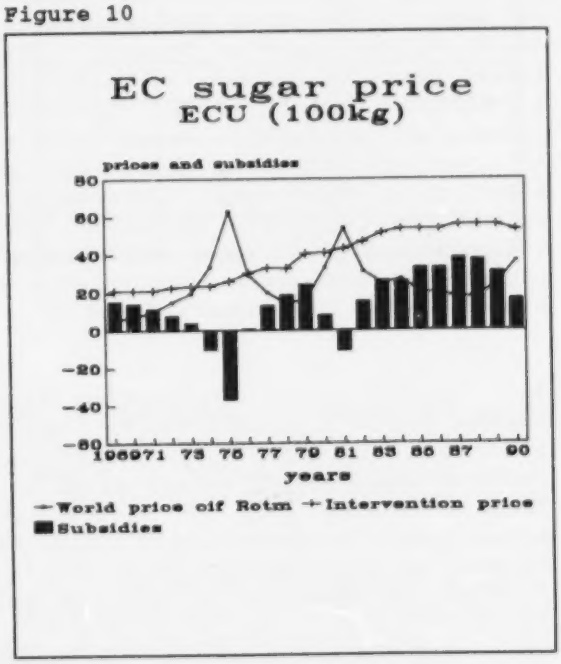

EC sugar prices
Production costs in Northern France
target price
- 5 per cent (regionally differentiated)
+ storage levy
+ freight costs from largest surplus area to most distant deficit area
intervention price for white sugar
minimum import price for white sugar
- processing margin
- processing margin
intervention price for raw sugar
minimum import price for raw sugar

Figure 10



(c.) Perspectives of reform of the sugar regime

91. Traditionally, sugar policy was fixed for five years. However, the last revision in 1990 conceroed only the two-year period until 1993. It maintained the same objectives.

92. Even though the level of sugar protection is quite high, and sugar expenses were around 8 per cent of the total agricultural expenditures of the European Union and 22.9 per cent of the Union's budget in 1990, the European Union considers the net cost of the sugar system (compared to the cost of other agricultural commodities) limited and well under control due to the quota and levy system. Therefore, the Union viewed sugar reform as one of the less urgent components of the CAP reform.[15] However, the pressure to complete the Single European Market and the Uruguay Round was expected to lead to a fundamental reform. Moreover, the levy system expired at the end of June 1993. The first reform concerned quota distribution by countries as it was in direct conflict with the objectives of the Single Market. Some countries had difficulties to fulfil their quotas, while others

had an excess of production. Transferability between national quotas may be considered. As a result of the GATT negotiations, a reduction of the global European Union sugar support level will have to be achieved; the minimum was expected to be around 12 per cent expressed in white sugar prices. In addition, the quotas would have to be reduced by around 3 per cent and the variable levies replaced by tariffs.[15]

B. Preferential trade

1. Generalized System of Preferences (GSP)

93. In 1971, a GSP for developing countries was agreed on by the European Union, the United States and Japan. This system has provided for the granting of preferential tariff rates on imports of many commodities in raw and processed forms from developing countries - including raw sugar - where normally "Most-Favoured-Nation" (MFN) duties apply on imports from other sources. In the United States and Japan, GSP tariff rates were 0 per cent on raw sugar; on white sugar they amounted to 5 per cent in Japan, a case of tariff escalation. One restriction was that sugar imports under the GSP conditions (reduced tariffs) into these countries be subject to specific quota arrangements.

2. Preferential quota arrangements

94. Until 1989 a varying but large part of the sugar traded on world markets came under long-term pricing or preferential arrangements. In 1989, the predominant special agreements were Cuba's barter arrangements with the former USSR and other centrally planned economies, which covered 4 to 5 million metric tons. There were also 19 African, Caribbean, and Pacific (ACP) developing countries which exported 1.4 metric tons of sugar each year to the European Union under the Lomé Convention at the internal premium support price (the intervention price). Furthermore, the United States paid a premium price for its quota imports of over 2 million metric tons a year from a group of about 40 countries. Altogether, about one-third of world sugar trade was conducted not at "world market prices," but at pre-arranged prices. This means that only about 18 million metric tons, or just under 20 per cent of world production, was traded at the "world" price.

Box III

Quota markets in 1989:

. former **USSR:**
approximate size, 3.5 million MT raw sugar
. **Eastern Europe:**
approximate size, 1.2 million MT raw sugar
. **European Union**
yearly quota, : 1.3 million MT raw sugar
. **USA:**
yearly quota,: 2.1 million MT raw sugar

95. Since 1989, sugar preferential trade has lost considerable importance with the reduction in Cuban total exports and, particularly, due to the drop in Cuban preferential trade with the former Soviet Union. As a result, preferential trade in sugar is now essentially reduced to the volumes traded under the sugar protocol annexed to the Lomé Convention (EU-ACP), the United States quota market arrangements and the barter arrangements between China and Cuba. In 1991, preferential trade was down to 3 million metric tons or about 13 per cent of world trade, as compared to 35 per cent in 1989 and over 40 per cent in 1982.

96. The free market pricing system is set to gain in significance in the near future with changes in domestic protective policies in a number of producing countries.

(a). Preferential arrangement between the former USSR, Eastern Europe and Cuba

97. Cuban preferential supplies were 4 to 5 million metric tons per annum delivered to the former USSR at a premium price; this amounted to about 75 per cent of Cuba's total exports of 6.5 to 7.0 million metric tons. About one million metric tons were exported to the former socialist countries of Eastern Europe.

98. After the collapse of the Soviet Union, Cuba signed new barter arrangements with Russia and some of the other CIS republics; however, the volumes involved were much smaller than previously, and effective prices were lower. Cuba exported about 3.8 million metric tons of raw sugar in 1991 to the former USSR, roughly half of Cuba's total sugar exports.

99. Russia is the biggest CIS importer of both raw and white sugar from Cuba (86 and 95 per cent of total imports, respectively). The price paid is based on world market prices - unlike the past, when it was around three times greater than the world market price.[17] As already mentioned, the quantities involved are now much smaller than before. When the USSR still existed, Cuban raw sugar was mostly refined in the Ukraine, and then "exported" to the main consumer market, i.e. Russia.

100. In 1989, Cuban sugar exports to Eastern Europe (excluding the former USSR) reached a record 1.2 million metric tons, reflecting increased demand due to poor harvests across Central Europe. However, since the rapid break-up of central planning, exports to the region have fallen precipitously. In 1991, exports to Eastern Europe were 68,000 metric tons, about 1 per cent of Cuba's total exports, compared to 15 percent in the period 1985-1989.

101. This situation has had serious implications for the Cuban economy and particularly the sugar industry. Availability of sugar for export in 1993 depends on imports of fuel and other vital inputs for the harvest, which in turn need to be guaranteed through sugar sales. In June 1993, sugar exports were temporally suspended as production of 7 million metric tons was not reached. This situation is the direct result of the decline in Cuban

Table 9
Cuban sugar exports by destination to selected regions

Main regions	Average 1984-1988	Annual 1989	Annual 1990	Annual 1991
Thousand metric tones, raw value				
[illegible]	5,710.0	5,469.0	1,574.0	3,835.0
Eastern Europe	1,029.4	1,191.2	615.2	68.0
China	349.5	667.1	693.1	736.5
Others	2213	2010	3362	2511
Total	7,698.1	7,577	6,444.3	7,631.4
Source: International Sugar Organization				

foreign exchange earnings from sugar (which led to reduced planting of new cane in 1991), severe cuts in fertilizer application, lack of herbicides and consequent deficiencies in weed control, less irrigation because of fuel shortages as well as unseasonably low, rainfall in parts of the country. Furthermore, Cuba's current foreign exchange earnings from sugar exports are still negatively affected by the need to fulfil commitments arising out of past swap arrangements.

(b). Preferential arrangement between European Union and ACP countries

102. In 1975, the first Lomé Convention between the member States of the European Union and 46 countries of Africa, the Caribbean and the Pacific (ACP) was concluded. The Lomé Convention is renewable every five years. The most recent one is Lomé IV, signed in 1990. Linked to the Convention are several protocols, including the sugar protocol, which grants preferential treatment for sugar exports (i.e. export of a fixed quota at a guaranteed price) from the ACP countries to the European Union.

103. At the time of the United Kingdom's accession to the European Union, many of the future ACP countries were Members of the Commonwealth Sugar Agreement. Protocol number 3 of the original Lomé Convention (signed on 28 February 1975) was one of the entry conditions of the United Kingdom. In July 1975, an agreement was signed between the European Union and the Republic of India containing the same provisions as the Sugar Protocol. Nevertheless, India does not enjoy exactly the same rights as ACP countries.

104. Article 1 of Protocol 3 provides that: "The community undertakes for an indefinite period to buy and import, at guaranteed prices, specific quantities of cane sugar, raw or white, which originate in the ACP States and which these States undertake to deliver to it." The same principle is repeated in the Sugar Protocol annexed to the Lomé IV Convention.

105. The sugar protocol is independent of the overall trading agreements of the Lomé Convention. The European Union commits itself for an indefinite period to import and buy 1,375,000 metric tons of raw sugar annually. Each party is allowed to renounce participation after six years.

106. In 1986, when Portugal joined the European Union, the country was authorized to import, during a transitory period, raw sugar equivalent to 75,000 metric tons a year of white sugar from Côte d'Ivoire, Malawi, Swaziland and Zimbabwe. These imports were under preferential tariffs, equal to the normal tariff on raw sugar minus the difference between the target price and the intervention price of the European Union. In 1993, other ACP countries were expected to start exporting raw sugar to Portugal (which adds 300,000 metric tons to the yearly ACP quota). The import price of ACP sugar is determined annually on the basis of the European Union intervention price for white sugar and is expressed in European Currency Units (ECUs.)

107. Although the guaranteed prices are reduced if the sugar delivered does not meet European Union's quality standards, the prices normally paid to ACP producers are the same as the European Union's raw and white sugar intervention prices, which are higher than world market prices. However, sugar from ACP countries is purchased and unpacked by the European Union at European ports CIF and no longer at Caribbean ports FOB as before 1975. The European Union can

automatically reduce the quotas if an ACP country does not fulfil its quota except for reasons outside ACP producers' control.

108. Despite the fact that the European Union is a net exporter, it imports raw sugar from the ACP, and often re-exports refined sugar to the same countries. This involves storage and transport costs. Each year, the European Union spends around 500 million ECUs (more than US$700 million) to buy sugar from ACP members.

109. As mentioned above, a reduction of the European Union sugar support level is expected - the minimum seems to be around 12 per cent expressed in white sugar prices. This would have a big impact on the ACP cane sugar producers, as their export price for sugar to the European Union is linked to the latter's intervention price for beetsugar. As the European Union accounts for more than half of exports of most ACP States (see annex 9), the consequence is that any cut in domestic sugar prices by the European Union will lead to a substantial reduction in ACP sugar export revenues. In 1991, the European Union decided to pay a "trade premium" of 30 million ECUs to compensate ACP producers for potential losses.

(c) United States import quota system

110. Since 1934, the Sugar Act, known as the Jones Castignan Act, has been the major instrument of American sugar policy. At that time, quotas for both foreign and domestic producers were introduced. Import quotas were set at 2.9 million metric tons and were almost entirely allocated to the Philippines and Cuba.

111. The Sugar Act expired in 1974 and was not replaced. Quotas were suspended during the period 1975-1981. In May 1982, import quotas were reintroduced, and fixed at 2.8 million metric tons. A forecast of domestic supply and demand leads from time to time to an adjustment of the quota in order to maintain market prices at about 3.5 cents per pound above the Market Stabilization Price.

(i) Global import quota

112. Import quotas, which were allocated to countries based on the average of 1975-1981 imports (not counting the years with the highest and lowest imports), with a few countries getting a fixed 5,000 metric tons basic quota, had decreased sharply between 1982 and 1992 (see table 7).

113. In mid-1989, Australia, supported by Canada, the European Union and Argentina, denounced "the waiver", a derogation from GATT rules granted in 1955 to the United States, which exempted the United States from GATT commitments where they would jeopardize the achievement of goals of certain domestic agricultural support measures. These countries claimed that the United States import quota system violated GATT rules. The GATT Council accepted the ruling against the US by a panel set up to arbitrate the case. In turn, the United States (in October 1990) replaced the quota system by a tariff-rate quota.

114. A global quota of 1,725,000 short tons of raw sugar was fixed in September 1991. The quota, adjusted yearly, reflects American domestic production. The minimum quota is 1,250,000 short tons of raw sugar. Under this quota, sugar enters the United States duty free (for GSP and Caribbean countries) or at a duty rate of 0.625 cents per pound from selected countries to which shares of the global quota are allocated. Only five or six countries actually pay this duty. To be granted the low tariff, exporters must have a certificate of quota

eligibility, issued by their Government. In 1990/91, some 41 countries had a share of this quota (see annex 10), while 69 per cent of it has been allocated to only eight countries (see table 10).

Table 10
Major Beneficieries of United States quotas

Country	Percentage
Dominican Republic	17.6
Brazil	14.9
Philippines	13.0
Australia	8.3
Guatemala	4.8
Argentina	4.3
Peru	4.1
El Salvador	2.6

Source: United States Department of Agriculture, Sugar and Sweetener, 1992.

(ii) Caribbean Basin Initiative (CBI)

115. The Caribbean Basin Initiative was signed in August 1983 and provides trade incentives and duty-free status to Central American and Caribbean countries for 12 years. This measure has been important for the Dominican Republic, Guatemala and Panama which had not been eligible for the benefits of the GSP for the large part of their exports because they exceeded the United States import quota. Presently, 24 countries fall under the CBI.

(iii) The North American Free Trade Agreement (NAFTA)

116. More than 70 per cent of the Mexican sugar import and export trade is conducted with the United States while about 7 per cent of the United States sugar trade is done with Mexico. Under NAFTA, Mexico will export to the United States all its sugar surplus resulting from the excess of its production over consumption, with a minimum of 7,258 metric tons (= the present quota) and a maximum of 25,000 metric tons in the first six years and 150,000 metric tons in the seventh year. These 150,000 metric tons will be increased in 10 per cent increments from the eighth year onwards. After the transition period, all Mexican sugar will enter the United States market at a zero tariff rate and without any quantity restrictions. Tariffs will be reduced during the first six years by 15 per cent annually and in equal yearly proportions thereafter.

117. Mexico has the capability of becoming a net sugar exporter because of the availability of land and high sugar cane yields. More remunerative prices, capital investment by private sector mills and modifications to the land tenure system to allow some amalgamation of "ejido" lands may all spur production increases. The result is that some quota beneficiaries outside Mexico have expressed concern about the potential impact of NAFTA on quota access.

118. For the next two sugar seasons, however, Mexico may require sizeable sugar imports, a substantial portion of which is likely to be refined sugar from the United States, facilitated by the latter's sugar re-export programme, destined mainly for industrial users.

119. On the other hand, Mexico may become a regular importer of HFCS from the United States, especially for use in the beverage industry in northern Mexico, which is far from the sugar-producing areas. A partial shift to HFCS imports would probably be spurred by a significant world sugar price increase, coupled with the lowering of the HFCS tariff rate currently set at 15 per cent *ad valorem*, which will be reduced annually, according to the agreement, over a period of 10 years, to result in duty-free trade. In the long run, however, Mexico will probably build up its own HFCS production capacity. Imports of United States maize to maize-deficient Mexico could be used as a starch source for the

Table 11
Summary of policies of major sugar exporters

Country or region	Price or production policies	Trade policies
European Union	Fixed prices to consumer and producer for quotas A and B. Production quotas by country and producer. Restrictions of substitutes.	Variable levies on imports. Variable subsidies on exports. Guaranteed imports of 1.4 million metric tons from African, Caribbean, and Pacific countries.
Australia	Fixed domestic prices until 1989, now prices follow the world market. Production quotas. Marketing regulation. In 1991, the Queensland Sugar Corporation replaced the Sugar Board	Pooled pricing of export and domestic sales by government board, with lower prices for exports. Ban on imports (ended 1 July 1989) replaced by fixed tariff
South Africa	Industry-controlled price stabilization programme High domestic prices	Sales by industry board, with lower prices for exports.
Brazil	Minimum producer prices. Regional production subsidies. license to assure adequate domestic	Government control of exports until 1989. Currently, exports are private, but subject to government supply.
Thailand	High domestic prices, fixed by a government body.	System of exports licenses
Philippines	Regulated producer, consumer prices.	Government control of quotas and the *quedan* system*. Until 1986, state controlled trading.
Dominican Republic	Government control of production and prices.	The majority of exports done by the State.
Cuba	Administered prices.	Government sales. Government control of milling.

*. *Quedan* is a paper which indicates the quantity of sugar belonging to growers but stored in mills. Serves as a form of security essential for the planters' financing

Table 12
Summary of policies of major sugar importers

Country of region	Price or production policies	Trade policies
CIS	Government regulation of prices.	
United States	Price supports for beet and cane processors and growers.	Guaranteed import quotas, duties and fees.
Japan	Fixed producer/consumer prices. Taxes on HFCS production.	Tariffs, surcharges, and variable levies on imports. Long-term contracts for some imports.
China	Prices determined by Government. Since early 1992, a domestic parallel free market exists	Government purchases and sales through a variety of bodies.
India	Fixed producer price for cane for "levy sugar". Fixed consumer price on part of sales.	Association control of export.
Canada	Government support for beet sugar.	None.

Source: UNCTAD country notes on sugar.

production of HFCS. Some maize wet-millers in Mexico, who now produce only starch, meal and feed, may instal HFCS capacity. The United States gains in either of the two scenarios envisaged (export of HFCS to Mexico, or the maize to produce it). If Mexican sweeteners evolve in a way that makes HFCS a competitive caloric sweetener, this would in turn free up sugar for export.

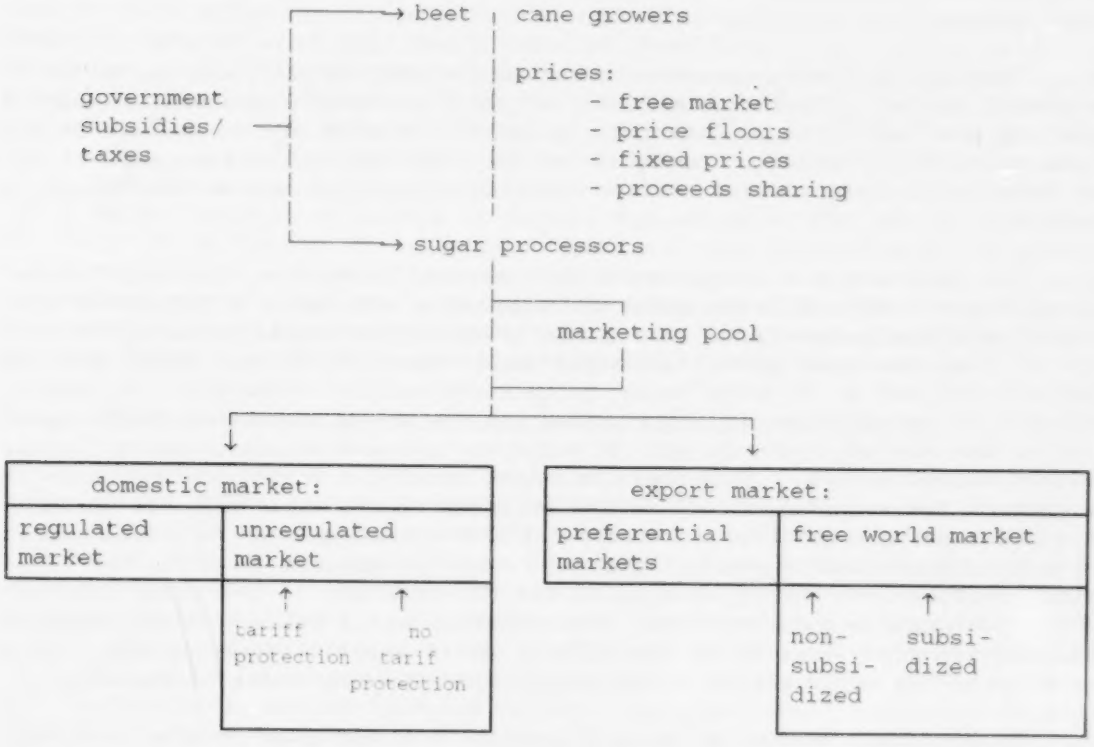
CHAPTER IV

PRICE FORMATION MECHANISMS

A. Domestic price formation systems

120. Most of the world's sugar production is insulated from "world market" price signals. What is known as the "world market" for sugar is not a reflection of the world sugar supply-demand balance, but rather a residual market: in most years it is a dumping ground for national surpluses; in some years it is the source-of-last-resort of badly needed sugar supply. The so-called world market prices, thus, do not reflect the world supply-demand, let alone production costs. Most producers cover their fixed costs on their domestic or preferential markets, hence world market prices need to cover only variable costs to be attractive. Alternatively, exports are directly subsidized to make them competitive. This is possible in part because three-quarters of world production and trade in sugar either occurs in non-GATT signatories or in developing countries eligible for "special and differential" treatment.

Chart I : Sugar price formation systems



121. The major part of world production, in particular in developed countries, has costs above normally prevailing world market prices.[18] The result is that most developed-country producers receive prices which are higher than those on

the world market. Many producers, such as the European Union producers, who are the main exporters of white sugar to the world market, can (thanks to the high internal price that they receive) cover all their fixed costs from sales on the domestic market. As a consequence, exports have to cover only variable costs. Producers in raw sugar exporting countries with high domestic consumer prices (such as the Philippines, South Africa, Thailand) find themselves in the same situation. In some producing countries, however, for example, Australia, Côte d'Ivoire, Canada, Colombia, Dominican Republic, Malaysia and Mauritius, producers are not able to cover fixed cost entirely on the domestic market.

122. Sugar markets are highly segmented. Flow chart I shows the structure of sugar price formation systems. As may be seen, a large variety of pricing systems prevails for sugar beet and cane growers, the processors of this produce, as well as consumers.

123. At the beginning of the production chain are the sugar beet and sugar cane growers. In general, Governments determine either which prices or which minimum prices growers will receive from sugar beet and cane processors, or which part of the final net proceeds of sugar sales has to be paid to beet and cane producers. In addition, in a number of countries Governments operate a stabilization fund, compensating beet and cane producers when prices paid by processors fall below a certain level. In a majority of sugar producing countries, beet and cane growers are subsidized, or at least protected from world market prices.

124. Beet and cane sugar processors can sell either on the local market or on the export market. They may sell all or part of their production through a marketing pool (with the result that the prices obtained are an average of the prices received on different markets), or sell directly to certain markets (so that marginal prices received reflect the marginal prices paid on the market in question).

125. For sugar exports, producers do not necessarily receive "the world market price". Barter trade, with the price of sugar often expressed in barrels of oil, is still relatively important. In a number of countries, sugar producers receive more or less the same price for sugar sold domestically and sugar that is exported (the case of European Union quota A and B sugar producers). In others, producers may receive two different prices (in the United States and the European Union in the case of producers who, in addition to A and B sugar, export C sugar at world market prices). Exporters may also receive a high fixed price as in the case of ACP sugar exporters to the European Union, or a high but variable price for a certain quantity (the case for those holding a preferential import quota for the United States). The remainder of exports goes to the "free market", with prices mostly related to the New York No 11 raw sugar contract and the London white sugar contract (discussed in detail below). A considerable part of world trade is done at annually or multi-annually fixed prices. Many exporters to the world market are directly subsidized by their Governments.

126. These highly segmented price formation systems present many problems. The main one is whether the correct incentives are given to beet and cane producers, and more specifically, whether cost-effective production is stimulated.

127. In many cases incentives are wrong, even at the country level. The prices that producers receive often do not take account of the transport costs

of producers from their fields to the mill - the price that they receive is an off-field price. Alternatively, their transport costs are subsidized or paid by the mills. This stimulates production in zones which are uneconomically far from mills. Also, quality is often not remunerated: farmers are paid for the weight of the cane or beet that they deliver, rather than for the sugar content of their cane or beet. Changes in pricing systems to reward quality production are recent, even in developed countries - in the United States for example, payment for sugar content was only introduced in the 1980s. In a number of cane-producing developing countries (e.g. Mexico, Thailand), similar changes in cane pricing systems have recently been made, although most systems still subsidize low-quality producers.

128. As many producers in exporting countries do not receive the marginal price for their sugar (the export price) but rather the average of domestic and export prices, they are encouraged to produce sugar beyond the level of what is economically justifiable for the country as such. As a result, world market supply has shifted from efficient, low-cost producers to less efficient ones.

129. While in most developed countries consumers pay a price much higher than the world market price, in many developing countries the opposite is the case. For political reasons (sugar is often considered a strategic good) sugar consumption is subsidized through fixed, artificially low prices, in general without the government compensating the sugar industry for this. This is the case in such major sugar producing and exporting countries as Colombia, Cuba, Dominican Republic, Fiji, Mauritius and Swaziland. In other developing countries, with a domestic market isolated from the world market, there are two sugar distribution networks: a price-controlled network, and a free-price network. Such is the case, for example, in China, Egypt, India and Indonesia. In the price-controlled network, producers normally receive a price which is lower than the price on the free domestic market, and sometimes even lower than world market prices; consumers in India, for example, pay one of the lowest prices in the world for the sugar that they buy in the controlled price network. Producers are obliged to sell a part of their production through the price-controlled network, and are in general not compensated for the low prices that they receive in this way; their profits, if any, have to come from that part of their production which they are allowed to sell on the free market.

B. Price formation mechanisms for exports to the world market

130. The world market prices for sugar are formed on two exchanges: on the New York Coffee, Sugar and Cocoa Exchange (CSCE) for raw sugar (New York No 11 contract) and on the London Commodity Exchange, formerly London Fox (London No 5 contract) for white sugar. All of the larger sugar traders and most of the world market's leading exporters and importers are directly or indirectly active in these markets. There are other markets, but they do not set world market prices: the Paris white sugar market (MATIF) is, in general, strongly linked to the London market while the Japanese raw and white sugar futures exchanges mainly reflect conditions in the Japanese market. The other sugar contracts traded on commodity futures exchanges (Philippines, Russia) mainly serve domestic markets.

131. Turnover on the New York No 11 market is very high; in 1991, it was approximately 40 times as high as free world market trade. This high turnover is possible because of a strong use of the market by non-trade related participants (see next paragraph). Because of this high turnover, the market is generally considered to be functioning well, suited for hedging, and (because

it is representative of world market conditions at least in the long-run) also well suited to be used for reference prices.

132. Nevertheless, there are a number of issues that need to be addressed with regard to the New York market. One is the large and growing participation of investment funds, one of the groups of non-trade-related participants. These funds are, in general, active on a number of different markets, including stock markets and financial futures exchanges. They can easily shift parts of their capital in or out of sugar for reasons which have nothing to do with developments in the sugar sector, but rather with developments in the other sectors where they are active. As a result, while not affecting long-term price development on the sugar market, they can add significantly to day-to-day instability; as a result daily prices do not always fully reflect the sugar sector's condition, which makes especially the use of executable orders more complicated.

133. Furthermore, the markets are sometimes manipulated. Manipulation attempts are normally short-term (limited even to a part of a trading day), usually involve only contracts near to delivery, and affect mainly trade houses and investment funds. Manipulations are, in general, variations on a theme, based on knowledge or assumptions about other companies' physical and futures positions. One common form involves large-scale traders with commitments to the Far East; to fulfil these commitments, they would prefer Thai sugar, but to buy this directly would imply the need to pay a high premium. However, if a trader has the impression that some competitors have Thai sugar on their physical books, and are short in futures, he can try to force them to deliver onto the exchange, by staying long. Another popular variation involves control over a less wanted origin of sugar: in a trade house's operations, it has taken a view on the prices (not covering delivery commitment, for instance), expecting them to fall. The trade house can bring this development about by delivering to the exchange an origin that no one wants (Argentinean sugar is normally used for this). This results in falling prices, because noone wants to risk staying long and having to take delivery of Argentinean sugar.

134. The major problem with the New York exchange is, however, the non-deliverability of Cuban sugar against the No 11 contract. Cuba is the main supplier of raw sugar in the Western Hemisphere - other Latin American sugar exporters have either reduced exports, or gradually shifted to exports of white sugar. Also, the level of the "Far East premium" (the extra price, compared to the No 11 price, that sugar commands in the Far East due to buoyant demand in that region) discourages the world's second and third largest raw sugar exporters (Australia and Thailand) from selling to the United States. Therefore, the No 11 contract suffers from delivery shortages which have nothing to do with the actual supply of raw sugar in the world market. As contracts go into their delivery month, there are often delivery problems and prices become abnormally high. This problem of backwardation, which has become recurrent since the late 1980s, strongly complicates the use of the New York No. 11 market.

135. In the white sugar markets in London participation has not been very strong -in 1991, futures and options volume was equivalent to only 1.5 times free world market trade in white sugar. This has limited the use of the London market (as well as that of the parallel Paris market). Many companies prefer to use the New York raw sugar market for their price risk management or as a price reference.

C. White sugar price differentials

136. As has been discussed in the introduction, there are different qualities of centrifugal sugar, all suitable for consumption: raw sugar, several types of white sugar with various degrees of polarization, refined sugar of different qualities and a number of "specialty sugars". Price differences between these types of sugar do not reflect differing processing costs, but rather consumer tastes and a number of government interventions.

137. In contrast with most products, the processing costs of sugar (from raw to refined sugar or from raw to whites) are not that significant. In some sugar-importing countries, raw sugar is even consumed just as it comes out of the centrifuges, and sometimes sold even at higher prices than white sugar because of consumer preferences or government subsidy programmes.

138. The price differentials between the three main types of sugar (raw, non-refined whites and refined) commonly traded internationally (and which can, to some extent, act as substitutes for each other) are not very large and price relations can change quickly and strongly. During certain periods, prices of white or refined sugar have even been lower on the world market than those of raws. As mentioned earlier, prices of raws are formed on the New York CSCE, where prices move fast due to a large-scale presence of investment funds and other non-trade-related participants. Prices of refined sugar fluctuate much less, because they are formed on the London and Paris futures exchanges, where trade houses dominate. It should also be taken into account that as a result of the existence of the dual source of white sugar (raw cane and beet), the international price of refined sugar reflects not so much the cost of refining over and above the cost of raw sugar as the supply and demand situation of refined sugar in the world market. Prices for non-refined white sugar are, to a large extent, the result of supply and demand in countries importing and exporting white sugar - for all white exporters, exports are mainly a surplus over domestic demand, while for importers, white sugar can be a cheap replacement for refined sugar. Non-refined white sugar prices have a clear ceiling, which is somewhat below refined sugar prices because importers can easily shift to refined sugar imports. There is, however, no price floor: most refined sugar importers will not be willing to shift to non-refined white sugar imports as consumers have problems with this lower-quality, somewhat yellowish, sugar.

139. Cane sugar producers and exporters can respond to changes in the relative prices of the different types of sugar by increasing or reducing the refining stage of their production process. Some do - a country such as Brazil probably benefits considerably from the flexibility it has in supplying the market with whichever product is in demand. Most other exporting countries, however, seem to lack the required flexibility.

D. Pricing practices

140. Sugar exporters and traders, and to a lesser extent importers, make wide use of complicated pricing formulae in their trade transactions, be they domestic or international. Different pricing clauses can be found in contracts for the export of sugar to the world market or the import of sugar from the world market. The following are the ones most used:

- Fixed prices: these are common in the case of tenders. Offers to sell or (in general) buy sugar are collected and the best offer is accepted by the importer

or exporter. This system is rarely the most beneficial one for the exporting or importing country involved, but may be preferred for practical reasons (transparency; the fact that those responsible for the purchase or sale cannot be blamed for having accepted an unfavourable price). Telephone tenders, which are more flexible, are becoming increasingly important.

- Average prices: usually, the price is a function of the average New York No 11 (raw sugar) price in the month prior to shipment (which is after the contract is signed - delivery is normally no earlier than two months after the signing of a contract). Option clauses can be inserted into this type of price formation mechanism.

- Calls: in the case of a seller, this pricing clause gives him the right to choose to price a certain tonnage of sugar (with a maximum tonnage per day) at the settlement price of the previous' day futures market trading. He notifies the buyer, who (as he is exposed to strong market movements) has the right to reject this price fixing for a maximum of, for example, two times a week or six times a month.

- Executable orders: this type of contract, which is growing increasingly important, has a pricing clause which determines the price as a differential from a certain reference price, most commonly a futures market price.

141. World sugar prices are highly volatile as world market sugar stocks are quite low - minor supply or demand shifts can have a relatively large effect on prices. Many industrial users have in recent years greatly reduced their sugar stocks because of improved manufacturing logistics. Therefore, in the case of raw sugar, very active use is made of the risk management instruments offered by the various commodity exchanges. Companies can also pass through a trade house, or alternatively, a bank or brokerage. These offer risk management packages which may put less stress on working capital (no margin requirements) and which are easier to handle (in terms of necessary control and accountancy systems) than standard commodity futures and option contracts. In effect, these trade houses, banks or brokerages will not keep the risks on their books, but will offset them either by back-to-back transactions (for instance, offsetting a long-term fixed-price contract with an exporter by one with a refiner), or cover them through transactions on futures exchanges.

142. In the case of white sugar, most clients prefer spot prices and prompt contracts (this is the case for most buyers in North Africa, the Middle East and Asia) - they try to choose a good moment for buying. Risk management is therefore quite rare, despite the fact that sugar is often one of the major imports, and futures and option markets could be used to lock in favourable prices. Raw sugar has to go through a refinery: buyers therefore prefer longer term arrangements and risk management become essential, principally for exporters and traders.

143. The use of futures and options markets is often indirect, through the use of specific pricing clauses in physical sales or purchasing contracts, such as through executable orders. These pricing clauses can, but need not, be combined with transactions on futures and options exchanges. A large number of commercial strategies are available to producers, consumers and traders.

E. Seasonality of world sugar prices

144. Seasonality in raw sugar prices is not very strong. Prices tend to be at their lowest level in the summer months - in July to September, average prices were lower than the yearly average almost two out of three years. This is linked to the production pattern in the main exporting countries, and in some large producing and importing countries. Cuba and Thailand both reach a seasonal peak in their exports in March-May, while Australia, Brazil and South Africa start harvesting their crop in May-June. World market availabilities thus build up during this period. At the same time, large producers and potential importers such as China and India complete their harvests by March; they thus have no import needs until the end of the year. Both factors put a downward pressure on prices.

145. On the other hand, a clear seasonal pattern is developing in white sugar prices and the white sugar premium (the price difference between raw sugar and white sugar). This seasonal pattern is determined by the importance of the production of the European Union and other countries of Western Europe. White sugar tends to be most expensive relative to raw sugar in the July-September period, the final months before the next European harvest. This is important for white sugar importers and for those who can undertake toll refining activities.

CHAPTER V

INTERNATIONAL SUGAR AGREEMENTS

A. Background

146. The first truly international Sugar Agreement was concluded in 1937 when the International Sugar Organisation (ISO) was created. Its main objective was to regulate world supply and prices of sugar on the basis of export quotas for individual member countries. Its economic provisions went into suspension in 1939 and remained so until the Agreement was terminated in 1953.

147. Since then, there have been four International Sugar Agreements with economic provisions and three with only administrative provisions. All those with economic provisions were based on export quotas and national stocks and aimed at stabilizing prices. Economic provisions were suspended or removed in the case of the 1958 and 1968 agreements during the life of those agreements.

148. In the 1953 and 1958 Sugar Agreements, the quota mechanism was supported by limitations on maximum stocks, a minimum stock provision and limitations on imports from non-members to encourage wider exporter membership. The 1968 Agreement was similar to the 1953 and 1958 agreements but included a commitment by exporters to provide certain quantities of sugar to those importing members for which they were traditional suppliers at a special price should the market price rise above an established price. Under the International Sugar Agreement of 1977, the price stabilization mechanism consisted of a combination of export quotas and nationally held, but internationally coordinated, stocks.

149. The 1973, 1984 and 1987 administrative agreements maintained the International Sugar Organization, which had the aim to further international cooperation on sugar matters and to provide an appropriate framework for the possible negotiation of an international sugar agreement with economic provisions. The 1987 International Sugar Agreement expired on 31 December 1992.

Table 13
International Sugar Agreements

Agreements	From	To
1937*	1938	1953
1953*	1954	1958
1958*	1959	1968
1968*	1969	1973
1973	1974	1977
1977*	1977	1984
1984	1984	1987
1987	1987	1992

* agreements with economic provisions

B. International Sugar Agreement 1992

150. The United Nations Sugar Conference 1992, held under the auspices of UNCTAD, established the text of the new International Sugar Agreement 1992, to succeed the 1987 one. It entered into force on 20 January 1993 for a period of three years, with a possibility of extension for successive periods of two years each.

151. The International Sugar Agreement 1992, an administrative agreement, is a significant streamlining of the previous one. Its objectives are to ensure enhanced international cooperation in connection with world sugar matters and related issues, to provide a forum for intergovernmental consultations on sugar and on ways to improve the world sugar economy, to facilitate trade by collecting and providing information on the world sugar market and other sweeteners, and to encourage increased demand for sugar, particularly for non-traditional uses. So as to make administration of the Agreement more efficient and rational, two changes were introduced. First, an administrative Committee was created with permanent membership for the ten largest financial contributors and non-permanent membership for eight additional members. Secondly, a single list of members was introduced; and the number of members' votes are now revised annually according to changes in members' market share.

CHAPTER VI

CONCLUSIONS AND POLICY SUGGESTIONS

A. Domestic protection and trade liberalization: the major issues

152. The major policy issue concerning the international sugar market is that related to the imbalance between supply and demand. There has been a persistent excess of supply over demand in the long-run which has led to price fluctuations greater than those for any other major commodity. Dealing with this problem requires addressing the main cause of this imbalance, namely, the distortions which are the effect of domestic policies of protection in the major producing countries. Without this, the recent changes towards market deregulation and liberalization in a number of sugar-producing developing countries, as well as any attempts to harmonize investment decisions among sugar producers with a view to achieving supply-demand balance, would have little impact on the good working of the sugar market.

153. Following market-oriented policy reforms in many sugar-producing developing countries and the end of Cuban preferential trade with the former Soviet Union, domestic protection regimes and obstacles to market access in developed countries remain as the major factor affecting in a negative way the good functioning of the international sugar market. Protection of domestic production in agriculture is one of the subjects of the Uruguay Round negotiations. These, together with the reforms of the Common Agricultural Policy of the European Union, might result in a liberalization of sugar production and trade which would lead to an increase in international prices, benefitting sugar producers who depend on sugar as a main source of export revenues. These reforms are also likely to contribute to the reduction of the extent of price fluctuations. The challenge for international cooperation in this area is to find alternative policy instruments to achieve the desired protection objectives in the major developed countries without interfering with the price mechanism in the sugar market, or closing off these markets to developing countries' exports.

154. Trade liberalization has potential negative effects for two types of countries. The first includes those developing countries which enjoy preferential access to the markets of the United States and the European Union. In the case of ACP and other preferred supplying countries, this preferential market is regarded as a form of economic aid and may also be replaced by direct compensations, which could be used, for example, to diversify exports (where this is possible) or to build sugar mills and refineries (where there are difficulties with diversification, as for example, in Barbados), much along the lines indicated later in section C. The second are net sugar-importing developing countries which would be affected in a negative way by price increases resulting from trade liberalization. The extent of this problem should be analysed with a view to identifying possible remedial action for those cases warranting it.

B. Improvements in efficiency

155. In order to meet the demands of the changed market structure, and especially because price transmission to consumers will be direct and no longer distorted, improvements in the efficiency of sugar production will be necessary. In many producing countries, real costs of producing sugar are higher than world prices. A large percentage of cane mills are more than 20 years old and process efficiency is low by virtue of obsolescence and a design bias in favour of

throughput. Inadequate capital and poor management have also been factors contributing to this poor performance. Producers which have maintained or improved their competitive position in sugar production have done so, at least in part, through technological innovation in both production and processing.

C. Diversification: better use of sugar cane and sugar beet by-products

156. Many sugar producing and exporting countries, concerned about the risk of sugar market imbalances and dependency on often depressed and highly volatile world market prices, have sought ways to better valorize their sugar crop by vertical diversification. Even today, there is still a big potential for improvement in this area.

157. Vertical diversification in the sugar industry can be achieved through intensified use of by-products and through production of alternative products which can substitute imports and increase exports and thus have a positive effect on the balance-of-payments of a country.

158. Trade in by-products will probably not have a significant impact on the supply-demand balance in the near future. However, in an integrated approach to vertical diversification, an agro-industrial complex in developing countries could eventually be envisaged, where by-products would be used as inputs for the domestic industry. For example, bagasse could be used (and partly already is) to produce animal feed, enriched with by-products from some of the molasses. Industrial alcohol produced from the remaining molasses could be used in the chemical industry.

159. As bagasse-based products have difficulty in penetrating highly competitive international markets, it would appear that their use in the manufacture of paper, pulp and board would mainly be to supply domestic markets, replacing imports. In view of the rapidly rising demand for paper and paper products in developing countries, and considering the balance-of-payment problems suffered by many of them, this import-substituting role may be important.

160. Potable alcohol (rhum) is a differentiated product and a potential exists for improving its quality, packaging and marketing to take advantage of the growing world market for alcoholic beverages. Every cane-producing country, regardless of size, has the possibility of developing or promoting a distinctive brand based on national characteristics.

161. As Brazil's Alcohol Programme has shown, under some conditions, programmes to produce anhydrous ethanol fuel for mixing with gasoline may be viable in oil-importing developing countries, particularly land-locked countries and regions with high oil transport costs. The main conditions for viability are availability of good quality arable land for sugar-cane production, climatic conditions favourable to the development of biomass and the existence of unemployed/under-employed, unskilled or semi-skilled labour. Ethanol production is an alternative to avoid dependency on the world sugar market and has other advantages such as environmental and employment benefits.

162. These first two strategies would be consistent with both the objectives of the 1992 International Sugar Agreement and the Common Fund for Commodities second account objectives, to "improve the productivity of sugar production by lowering the cost of production, to make sugar less dependent on the world market price by means of *vertical diversification* and in general the more efficient use of the raw materials and by-products of sugar production". Improving productivity

and vertical diversification are specifically mentioned in the CFC agreement in relation to lending by the second account.

D. Diversification: adding value to sugar

163. Examples of adding value to sugar are the extension of the process from raw sugar to white sugar and the production of higher value speciality sugar for the health food market.

164. The share of white sugar in international trade has been increasing steadily over recent decades, a trend likely to continue as the processing margins are squeezed for free-standing refineries using imported raws. White sugar accounted for 47 per cent of total world sugar trade in 1992, against 40 per cent in 1991, and around 30 per cent at the beginning of the 1980s.

165. Producers are already concentrating on the development of white end mills. In consequence, there has been an increase in trade of non-refined white sugars - plantation whites, washed whites, or so-called "special sugar" (such as Demerara and Golden Granulated).

166. There is great potential in this area. In 1991, around 73 per cent of developing country exports were in the form of raw sugar; they were also predominantly white sugar importers, with white sugar accounting for more than 60 per cent of their imports. Improvements in processing technology may have created scope for some substitution of white sugar imports by higher quality unrefined sugar from tropical sources; it is likely that these direct-consumption sugars will find their real potential in the domestic markets of larger cane producers and other lower income countries. These lower-quality whites now find an easier market: African countries, which in the past insisted on EEC No. 2 quality, now demand more low-quality white sugar, e.g. Brazilian; the same is true for North Africa, including Egypt, as well as Middle Eastern countries. This demand offers an opportunity for traditional raw sugar exporters to increase value added by installing relatively cheap "white ends" on their mills to produced a white sugar of acceptable export quality.

167. Specialty raws, such as Demerara, are enjoying a growth of demand in developed countries and - although they will continue to account for a small share of production and trade - they can be a lucrative alternative for the individual enterprises that adopt this "niche" marketing strategy. One example of a group of enterprises which pursues this strategy is the Mauritius Sugar Syndicate.

E. Improvement of the functioning of sugar markets

168. An important task for the international community is to improve the functioning of the sugar markets, in particular greater transparency of commodity exchanges. This aim is in view of reducing the price volatility of sugar. Price volatility, as has been shown, makes prediction of export earnings from the sale of sugar very difficult for producing countries. Short-term manipulations by trading houses and investment funds and non-deliverability of Cuban sugar against the New York No 11 contract are two further issues calling for attention. They have already been discussed by an expert group under the auspices of UNCTAD but further efforts must be made to achieve the final goal of establishing a market which reflects the real situation of sugar supply and demand.

ANNEX I

Non-centrifugal sugar

1. Virtually all internationally traded sugar is produced by the centrifugal method. There are, however, a number of countries where a large part of sugar cane is not boiled in a vacuum pan (the centrifugal process), but in an open pan. This "open-pan" sugar (called gur or khandsari in the Indian sub-continent, panela in Colombia) accounts for approximately one-sixth of developing country sugar cane production. Non-centrifugal sugar is normally ignored in production and consumption statistics (including those used in the main body of this report); this may distort figures on the growth of the sugar sector in a number of countries, e.g. Pakistan.

2. As table 1 shows, the main regions for the production of non-centrifugal sugar are the Indian subcontinent, Thailand, China, Central America and Colombia. The only developed country producing a small amount of non-centrifugal sugar is Japan. In a few countries (Bangladesh, Haiti, Myanmar) most sugar cane is processed traditionally.

3. India accounts for more than 60 per cent of world non-centrifugal sugar production. Two types are produced, gur and khandsari. Gur is a village-made product, similar to caked brown sugar. Khandsari is a partially refined sugar made by small-scale units. The role of these traditional sugars has declined considerably in recent decades, with large year-to-year fluctuations.

Table 1
Main countries producing non-centrifugal sugar
(1,000 MT raw value, 1991)

Country	Centrifugal sugar	Non-centrifugal sugar
Bangladesh	262	380
Brazil	8,675	240
China	7,836	454
Colombia	1,617	980
Ecuador	319	54
Guatemala	918	38
Haiti	30	81
Honduras	186	21
India	12,528	8,200
Indonesia	2,334	50
Kenya	532	27
Mexico	3,943	58
Myanmar	21	160
Nigeria	59	40
Pakistan	2,086	1,150
Peru	550	21
Thailand	4,006	615
Total, developing countries	**69,867**	**12,682**
Total world	**112,224**	**12,693**
Source: FAO Production Yearbook 1991		

Table 2
India:Use of sugar cane
(million MT)

	centrifugal sugar	gur/khandsari
1987	85	79
1988	94	79
1989	86	94

4. For example: Whereas consumer prices for centrifugal sugar are to a large extent controlled by the government, prices for gur and khandsari are not. In the vivid competition between sugar mills and gur and khandsari producers, the latter are often able to offer more attractive cane prices to farmers.

5. Pakistan is the second largest producer of non-centrifugal sugar. Centrifugal sugar production was introduced only in the late 1930s, and until the early 1980s traditional sugars remained dominant. During the 1980s the population increased strongly, as did income levels and the degree of urbanization. As a result, demand shifted towards centrifugal sugar. Gur consumption has decreased from 15 kg per capita in the late 1970s to less than 8 kg in 1990. At the same time, centrifugal sugar production grew spectacularly: from 1982/83 to 1989/90 the amount of sugar cane processed centrifugally increased by two-thirds (8 million MT), while the use of cane for gur/khandsari declined by 4.6 million MT.

6. At a world level, the production of non-centrifugal sugar has declined continuously since the 1960s; the main exception is Colombia, which has seen an increase in production in recent years. In the period 1986-1991, panela production increased from 857,000 MT to 980,000 MT. Much of this increase was due to an improvement in productivity resulting from government support policies. In 1989, the government, in order to provide rural employment and raise peasant incomes, increased credits available to the non-centrifugal sugar sector and improved its technical assistance. In this way, it helped some 55,000 small farmers, scattered throughout the country (centrifugal sugar production is concentrated in the Cali valley).

ANNEX II

Bagasse

Bagasse is the residual cane left after the juice has been squeezed out. About 80-85 per cent of bagasse produced is used as fuel in sugar mills (this is normal practice, although in some cases where there is a cheaper energy source, all the bagasse becomes available for non-energy uses). The rest can be used to manufacture, inter alia, paper, wallboard, animal feed and furfural (an industrial chemical used as solvent, as a raw material for synthetic resins and in petroleum refining.) Excess bagasse can also be used as an energy source to generate electricity which can be fed into the local electricity supply system.

One use of bagasse with particularly good economic and social benefits is its use as a domestic and industrial energy source. Besides the cost advantage, the use of bagasse leads to a reduction of wood for fuel and consequently better conservation of forests and the environment.

The establishment of a paper industry which uses bagasse has become an important element in the development programmes of many countries. This is mainly due to the problems they face in securing pulp because of scarcity of wood. There are approximately 40 bagasse plants that produce fibreboard and particle board in the world (1989), of which 25 produce particle board and 15 fibreboard. Bagasse can be widely used, especially in the furniture industry. Particle board is used for kitchen furniture, wardrobes, desks and other household furniture. Bagasse-based products have had problems penetrating highly competitive international markets. Board made from bagasse suffers from problems of quality, and very little has entered world trade. It would appear that the main role of basgasse-based paper, pulp and board products will be to supply domestic markets, replacing imports of wood. In view of strong growth in demand for paper in developing countries and the balance-of-payment problems suffered by many, this import-substituting role is potentially important.

Furfural, another derivate from bagasse, is used as a raw material for the production of furfuryl alcohol, tetrahydrofuran and other derivatives. World production doubled in the last decade. More than 90 per cent of all the furfural produced is used in the industrialized countries, the main importer being the European Community. Taken together, there is a surplus plant capacity in the world for the production of furfural. The potential for furfuryl alcohol production is higher in countries with appropriate chemical expertise. As furfural competes with by-products of the petroleum industry, it is vulnerable to a decline in the price of oil.

ANNEX III

Molasses production

Sugar molasses is a by-product of the sugar industry. It is defined as the syrupy liquid remaining after the repeated crystallization of sucrose (usually in three phases) from the so-called mother syrup. The mother syrup is a mixture of water and juices derived either from sugar cane or from sugar beet. For a few years, molasses have been further desugarized in a number of countries (principally the US); this process is likely to become more widely adopted, in the short term adding over 200,000 tonnes to world sugar supply. From the final molasses, also known as blackstrap molasses, which still contain 50 to 60 per cent of sucrose, no more sugar can economically be obtained by simple crystallization.

Molasses can be used to manufacture industrial or fuel alcohol, to enrich animal feed directly or by fermenting to produce nutrient yeasts or to produce potable alcohol. These industries exist in nearly all the sugar-cane producing countries. In 1990, the world production of molasses was about 36 million tonnes, of which 20 million tonnes were cane molasses; of the latter 6 million tonnes were traded internationally.

The most important exporting region is Asia (in particular Indonesia, Thailand and the Philippines), followed by Latin American countries (in particular Brazil, Cuba and Mexico). Australia and South Africa are also important molasses suppliers, mainly to the United States.

The major consumers of molasses are the United States, Japan and the EEC. They consume around 80 per cent of the total world molasses supply. The price of molasses is characterized by great fluctuations on the world market. Nearly all the molasses on the international market come from sugar-cane. The countries producing sugar beet consume their own molasses.

Other uses of molasses apart from those mentioned earlier are lysine (which is mainly produced in France, Czechoslovakia, Bulgaria, the USSR, Japan and Mexico), yeast, citric acid and monosodium glutamate, the main producer of which is Japan followed by the United States, France, Italy and the European Union. The technology for producing monosodium glutamate is rather sophisticated.

ANNEX IV

Sugar cane by-products in different countries

Countries	Bagasse	Pulp & paper	Boards	Molasses	Animal feed	Industrial & anhydrous ethyl alcohol	Citric acid	Filter mud	Filter coke & medicaments	Fulfural
Argentina	X	X		X		X				
Australia	X			X						
Brazil	X			X		X				
China	X	X	X	X	X		X			
Colombia	X	X		X	X					
Côte d'Ivoire	X			X						
Cuba	X	X	X	X	X	X		X	X	
Dominican Republic	X			X		X		X		X
Fiji	X		X	X		X				
Guyana	X			X						
India	X	X		X	X	X	X			X
Indonesia	X			X						
Mauritius	X			X		X				
Mexico	X	X	X	X	X		X	X		X
Pakistan	X	X		X		X				
Philippines	X			X		X				
South Africa	X			X	X	X				
Swaziland	X			X						
Thailand	X		X	X		X				
Turkey	X			X						
Zimbabwe	X			X						

Source: UNCTAD I&M Structure Study (preliminary list)

ANNEX V

Main alternative sweeteners

(in million tonnes sugar equivalent, 1992)

Products	Quantity	Characteristics
Caloric sweeteners		
HFCS, also called isoglucose	7.9	HFCS is mainly produced from maize, but it can be processed from any other starch source. It is the world's predominant alternative sweetener. Its sweetening strength is only 0.4 to 0.6 times that of sugar. There are two major types of HFCS: HFCS-42 containing 42 per cent fructose was introduced in the 1960's, while HFCS-55 was discovered in the 1970s. HFCS has a large number of advantages such as solubility, high fermentability, high moisture content, low viscosity, as well as good flavour and stability in acidity and high temperature. However, its main advantage is its low relative cost in a number of countries where the domestic sugar sector is protected. As it is in liquid form, HFCS is basically used in non-alcoholic beverages (in the US it has entirely replaced sugar in this sector), in canning, and in processed foods, but it has had difficulty penetrating the baking and confectionery markets. A new HFCS-related product brought on the market by Staley Continental (Tate & Lyle) in 1989, crystalline fructose, was expected to compete more directly with sugar, as it was in dry form. However, due to high costs and lack of stability, its production has reached only 70,000 MT, and no further major inroads in the market are expected. HFCS is produced and consumed principally in the USA and Japan, but also in Republic of Korea, the EC, Argentina and elsewhere. The US is the largest consumer, with 72 per cent of the world total. The growth rate of HFCS consumption tended to slow in recent years and some markets such as the US, are virtually saturated.
Glucose	5.80	Glucose and dextrose were developed for human consumption in the last century, but since the appearance of HFCS, they are no longer very competitive, neither with sugar nor with the new substitutes. Hence production and consumption are declining. They are principally used in non-food sectors, such as chemical and pharmaceutical industries.
Dextrose	1.20	
High-intensity sweeteners		
Saccharin	9.31	Saccharin is the oldest low caloric sweetener, discovered in 1879. It is 300-400 times sweeter than sugar. Its greatest advantage is its very low cost. Despite its bad taste and the suspicion that if consumed in excess it could have negative health effects, it is still the most-consumed high-intensity sweetener (in more than 90 countries). As it is soluble and highly stable in aqueous solutions, it can be mixed with several other sweeteners. Almost 80 per cent is used in food (traditionally, it is a product for the diabetic market) and drug manufacturing. However, its human consumption has fallen strongly in developed countries, due to stricter regulations (in the USA for example, saccharin is sold with a label warning of possible cancerous effects since 1977) and competition from other sweeteners.
Aspartame	1.63	Aspartame was discovered in 1965 and first brought on the market in 1982. It is best known by its main trade mark NutraSweet. Some 150-200 times sweeter than sugar, it is colourless, and has a good taste. Aspartame is consumed throughout the world (90 countries). It is becoming the most important alternative caloric sweetener in developed countries. It is principally used in diet beverages and milk products. As it does not withstand high temperatures, it cannot be used in cooked or baked products. New forms of aspartame have been developed to overcome this problem, but are not yet marketed.
Cyclamate	0.41	Cyclamate was discovered in 1949. It is 25-30 times sweeter than sugar. It does not have a very good taste; however, it is cheap to produce. As it is suspected of having negative health effects, it has been banned in many countries. Nevertheless, some of these have lately re-admitted its use, and it is now consumed in more than 50 countries, principally in Asia. Cyclamates are usually blended with other low caloric sweeteners to obtain a more intensive taste, but it can also be used in soft drinks, foods or in cooked and baked products.
Acesulfame-k	0.04	Acesulfame-k is related to saccharin. It is 150-200 times sweeter than sugar. It is marketed under the trade-marks Sunnette and Sweet One, manufactured by Hoechst Celanese. It leaves a bitter after taste; however, it withstands very well high temperatures and acidity. Although acesulfame is a new low caloric sweetener, it is consumed in over 30 countries. It is used in soft drinks, candies, chewing gums, instant coffee, as well as in baked and cooked products.
Stevioside	0.02	Sales of Stevioside, obtained from a tropical plant, is allowed only in Paraguay, Brazil and a number of Asian countries. It is around 200-300 times sweeter than sugar. It leaves an aftertaste but is soluble and stable in solutions.
Sucralose	Sucralose was discovered in 1976. It is obtained from sugar by making small chemical changes, and is 600 times sweeter than sugar. It is produced as a white crystalline powder, has high stability, and is also resistant to high temperatures and acidity. It has a good albeit somewhat bitter flavour. It could replace sugar in some industrial uses. Its consumption is still low because it has entered the market only very recently. In Canada in 1991, and is still under approval procedure in the USA and the EC. Presently 50 products such as beverages, desserts, chewing gums as well as baked and cooked products contain sucralose. In Canada, it had already captured 15 per cent of the low caloric table top market six months after its introduction in April 1992.	
Others	There are many other low caloric sweeteners such as alitame (2,000 times sweeter than sugar), taumatine (2,000-3,000 times), talin, glycyrrhizin, L-sugar, but consumption is low because most of them are still being tested for potential negative side-effects.	
Bulking sweeteners	0.43	These are also known as sugar-alcohol or polyols. High intensity sweeteners have the disadvantage of reducing the volume of the products in which they are used. Bulking agents, to be used in combination with high-intensity sweeteners, have been developed to help when a recovery of the volume of products is necessary. Because of health considerations, their uses are mainly limited to chewing gums, toothpaste and special dietary foods; they are forbidden in beverages. Four of them are being marketed: sorbitol (0.5-0.6 times as sweeter as sugar), xylitol (with a similar sweetening power as sugar), mannitol (0.5-0.7) and maltitol (0.85-0.95).

ANNEX VI

Largest sugar producing companies at the first level of processing (raw cane sugar and beet sugar), in approximate order of importance

Owning entity	Sugar-producing company	Activities
Government of Cuba, Ministry of Sugar Industry 7.7 % of world sugar production 12.2 % of world cane sugar production	Union of Sugar Industries	Approximately five-sixths of Cuba's sugarcane is grown on estates owned by the member companies of the Union of Sugar Companies. The Union, through its member companies, also owns all the country's sugar mills and refineries. Raw sugar production in 1990 was 8.44 million MT of which about 1 million MT was refined.
Government of China 5.6 % of world sugar production 6.7 % of world cane sugar production 3.9 % of world beet sugar production	Several state governments	State governments own all mills in China. The most important ones are the province of Guandong (which has its own marketing company in Hong Kong to export surpluses and arrange toll-refining) and the Gaungxi Region, with a production of 1.83 million MT, raw value, and 1.44 million MT respectively. Total production in 1990 was 6.2 million MT.
Ferruzzi Finanziara (Italy) 2.2 % of world sugar production 5.8 % of world beet sugar production	Ferruzzi is one of the largest industrial groups in the world. Close to two-thirds of its turnover is in agro-industrial and chemical sectors. Edible oils are its main area of activity. Ferruzzi is also Europe's largest producer of sugar substitutes, and controls sugar marketing companies active in Italy, France and Spain.	
	Eridiana (Italy)	Eridiana operates 11 sugar factories and one sugar distillery in Italy. White sugar production in 1991 was 838,503 MT.
	Beghin-Say (France)	Beghin-Say operates 9 sugar factories in France, of which two also contain refineries. White sugar production in 1991 was 1.1 million MT. Beghin-Say controls 4 Hungarian sugarbeet producers, which produce 150,000-200,000 MT/year. It is also one of the larger shareholders (with 13 per cent) in Saint Louis, one of the other main French producers.
	Azucarera del Litoral (Uruguay)	A share of 51 per cent is owned by Beghin Say.
Südzucker (Germany) 2.1 % of world sugar production 5.5 % of world beet sugar production	Südzucker owns, directly and through two subsidiaries, about one third of Germany's sugar factories. In Belgium, it owns the Raffinerie Tirlemontoise SA, which operates 4 sugar factories. The company also produces alternative sweeteners. White sugar production in 1991: Südzucker AG: 1.13 m MT Südzucker GmbH (former GDR): 302,100 m MT Tirlemontoise: 631,400 MT	
Government of Indonesia 1.8 % of world sugar production 2.9 % of world cane sugar production	PT Perkebunan	PT Perkebunan owns, through a number of regional companies, 57 sugar mills, out of Indonesia's 67. Total raw sugar production is approximately 2 million MT. PTP has its own sugar estates, with 75,000 ha of cane, and buys from outgrowers.
Government of Turkey 1.4 % of world sugar production 3.8 % of world beet sugar production	Turkiye Seker Fabrikalari A.S.	Turkiye Seker Fabrikalari controls all 27 Turkish sugar beet factories, producing in 1990 about 1.57 million MT of beet sugar (raw value).

Owning entity	Sugar-producing company	Activities
Associated British Foods (UK) 1.2 % of world sugar production 3.2 % of world beet sugar production	Associated British Foods acquired British Sugar from Berisford in 1991, after a take-over battle with Tate & Lyle and Ferruzzi. The company is well-diversified in food production and associated services, and is particularly active within the United Kingdom.	
	British Sugar Plc	British Sugar is the only beet producer in the United Kingdom, owning 10 factories and producing 1.22 million MT of white sugar in 1991. In addition, it has a major interest in the Polish sugar industry.
Danisco (Danmark) 1.0 % of world sugar production 2.6 % of world beet sugar production	Danisco is a large food, drink and packaging company. It owns all 4 sugar factories in Denmark, and is consolidating a number of factories it acquired in former Eastern Germany in 1991. In September 1992, Danisco also acquired Sweden's only sugar producer, Sockerbolaget. Danisco's EC production quota is 425,000 MT of white sugar in Denmark and 126,000 MT in Germany; its actual production is higher because it is one of Europe's sugar 'C' exporters. Production in Denmark was 543,000 MT in 1990. Sockerbolaget's production of white sugar was 406,000 MT in 1990.	
Tate & Lyle (UK) 1.0 % of world sugar production 1.0 % of world cane sugar production 1.1 % of world beet sugar production	Tate & Lyle is the world's major private sugar producing company. In addition to its activities in sugar, Tate & Lyle is also the US 2nd largest and Europe's 3rd largest HFCS producer. It also owns a shipbuilding enterprise and an insurance company. Through Tate & Lyle International, it is a major international sugar trader, and through a number of specialized companies, the world's largest trader in molasses. In sugar production, its major involvement is in sugar refining (processing close to 3 million MT of raw sugar).	
	50 % in Booker Tate (UK)	Booker Tate manages sugar estates and mills in Ethiopia, Guyana, Jamaica, Kenya, Papua New Guinea, Sri Lanka and Swaziland (together producing over 800,000 MT of sugar), and provides regular technical assistance to estates and mills in a large number of countries. It is likely to take over a major share of the Guyana Sugar Corporation and is a joint-venture partner in mills in several countries.
	50 % Eastern Sugar (Holland)	Eastern Sugar has a share of 34.6 % in the Hungarian sugar company Kaba (which produces some 75,000 MT/year)
	30 % in Talres Development BV (Holland)	Talres owns 21.3 % of SGAE (Spain), which operates 6 sugar factories
	The Western Sugar Co. (USA)	The Western Sugar Cy is one of the leading US beet sugar producers, owning seven factories; production: approximately 400,000 MT of white sugar.
	Redpath Sugar (Canada)	Redpath is Canada's second largest sugar producer, principally processing imported raw cane sugar, but also some sugar beets.
	Bundaberg Sugar Co. (Australia)	Acquired in 1991. Bundaberg is Australia's largest cane grower, and second largest raw sugar miller, producing 0.7 million tonnes of sugar annually in six sugar mills. Bundaberg also has a small sugar refinery, and a share in a rum producing company.
CSR Ltd (Australia) 0.9 % of world sugar production 1.5 % of world cane sugar production	CSR is Australia's largest producer of raw and refined sugar, and a leading building and construction materials company. Operations encompass New Zealand and the United States; other investments include bauxite, alumina and aluminium.	
	CSR Ltd - Sugar Division	CSR operates 7 mills and 4 refineries. Its raw sugar production in 1990 stood at 1,071,310 MT, of which half was further processed into refined sugar. CSR handles the marketing of all Australian raw sugar. It has a 20 per cent share in Czarnikow (UK), its main broker.

Owning entity	Sugar-producing company	Activities
Uttar Pradesh State Sugar Corp. (India) 0.9 % of world sugar production 1.4 % of world cane sugar production	Owns 30 factories, producing up to 1 million MT	
Government of Egypt 0.9 % of world sugar production 1.3 % of world cane sugar production 0.2 % of world beet sugar production	Société des Sucreries et de Distillerie d'Egypte	Sole sugarcane producer and miller in Egypt, producing about 865,000 MT of raw sugar a year.
	Delta Sugar Co.	Sole sugarbeet producer and miller in Egypt, producing about 90,000 MT raw equivalent of beet sugar.
Anglo-American Corporation, through **Tongaat-Hulett Group Ltd** (South Africa) 0.8 % of world sugar production 1.3 % of world cane sugar production	Anglo-American is the world's main metals mining group. The Tongaat-Hulett group is active in sugar production and processing, production of building materials, processed foods, aluminium products, textiles, starch and sweeteners. Sugar accounts for over one-quarter of the group's turnover.	
	Tongaat-Hulett Sugar Ltd.	Owns 6 estates/mills (producing about 10 per cent of South Africa's cane and milling 43 per cent of it), South Africa's major refinery and also a cane transport company.
Barlow Rand Corp., through **CR Smith Ltd** (South-Africa) 0.8 % of world sugar production 1.2 % of world cane sugar production	Barlow Rand is a large mining concern - among others, the world's fourth largest gold producer. C.G. Smith is involved in a series of activities, including the production of ethyl alcohols, animal feeds and chemical additives.	
	CR Smith Sugar Ltd.	CG Smith Sugar owns 6 estates/mills (of which 3 with attached sugar refinery), producing about 10 per cent of South Africa's cane and milling 38 per cent of it; a chemicals factory, and SA Sugar Distributors (Pty) Ltd., which dominates sugar distribution in South Africa..
Zuckerverbund Nord AG (Germany) 0.8 % of world sugar production 2.1 % of world beet sugar production	Zuckerverbund Nord, of which a stake of 50.76 per cent is owned by the Hannover Zucker Aktiengesellschaft Lehrte, is Germany's second larger producer. With 13 factories, the company produced 791,000 MT of white sugar in 1990/91, and 755,100 MT in 1991/92.	
American Crystal Sugar Company (USA) 0.7 % of world sugar production 2.0 % of world beet sugar production	The American Crystal Sugar Company was set up as a private company, but taken over by sugarbeet growers in 1973. It now is an agricultural co-operative owned by more than 2,100 farmers. Its white sugar production in 1991 was 682,000 MT, in 1992 it was 747,000 MT.	
Worms & Cie, through **Saint Louis** (France)	Worms & Cie is a family-owned holding. It controls Saint Louis, one of Europe's largest agro-industrial groups. The company owns, among others, Europe's largest paper producer, and produces also instant food. Sugar accounted for one-sixth of the company's 1991 turnover, and for 41 per cent of profits.	

Owning entity	Sugar-producing company	Activities
0.7 % of world sugar production 1.7 % of world beet sugar production	Générale Sucrière (France)	Générale Sucrière owns: - 5 sugar beet factories and one sugar refinery in France (producing 649,000 MT in 1990/91) - a share of 50 % in Eastern Sugar (Holland), which owns 34.6 % of the Hungarian sugar company Kaba. - a share of 41.42 % in Talres (Holland), which has a 21 % share in Sociedad General Azucarera de España (SGAE), Spain - a share of 44.06 in Gardel, which owns a sugar cane mill in Guadeloupe. Générale Sucrière owns a share of 65 % in Eurosucre, which sells its sugar together with that of Sucre Union. It also has a stake of 10 % in two Singapore-based sugar-shipping companies.
Holly Sugar Corp. (USA) 0.7 % of world sugar production 1.8 % of world beet sugar production	Produces around 600,000 MT of beet sugar a year. The company is also active in cane sugar refining, which brings its total sugar production to over 1 million MT a year.	
Suiker Unie (Netherlands) 0.7 % of world sugar production 1.7 % of world beet sugar production	This co-operative produces around 700,000 MT of white beet sugar a year; its EC A+B quota amounts to 544,000 MT, the remainder is exported as C sugar. The company is also active in the production of alcohol from molasses and in international sugar trade.	
Lonrho (United Kingdom) 0.7 % of world sugar production 1.1 % of world cane sugar production	The Lonrho group comprises some 900 companies which are active in 80 countries. Lonrho is especially strongly represented in Africa. Its principal activities are gold mining, agriculture (including ranching and the production of tea and sugar), manufacturing of textiles, oil and gas production, transport, insurance, hotels and international trade. It is involved in sugar through Lonrho Sugar and through a joint-venture (set up in 1990) with the Namibian Government for the production of sugar; an initial production of 60,000 MT in 1993, increasing to 100,000 MT in 1995 is planned.	
	Lonrho Sugar Corp. (Swaziland)	Lonrho Sugar Corp. controls Ubombo Ranches Ltd (including a refinery; total production in 1991/92 153,000 MT) in Swaziland, Glendale estate in South Africa (production in 1990/91 306,000 MT); the Sugar Corporation of Malawi (production in 1991/92: 109,000 MT); the Highlands, Britannia and Mon Tresor-Mon Desert Sugar Estates in Mauritius (total production: approximately 100,000 MT). It also has a minority interest in (and manages) the Dwangwa Sugar Corp. in Malawi, which produced in 1991/92 95,000 MT.
Mackay Sugar Co-operative Association 0.6 % of world sugar production 1.1 % of world cane sugar production	Mackay is Australia's third largest sugar milling group, producing over 700,000 MT of raw sugar a year. It is also constructing an export-oriented 350,000 MT/year refinery in cooperation with E&F Man; this refinery was to become operational in 1993.	
US Sugar Corp. (USA)	Produces over 600,000 MT of raw sugar a year.	
Flo-Sun (USA)	Produces 600,000 MT of raw sugar, of which it processes itself 182,000 MT.	
Kisan Sahakari Chini Mills Ltd. (India) 0.5 % of world sugar production 0.9 % of world cane sugar production	A farmers' cooperative, which owns 22 factories, producing over 600,000 MT of white cane sugar.	

Owning entity	Sugar-producing company	Activities
Thai Roong Ruang (Thailand) 0.5 % of world sugar production 0.9 % of world cane sugar production		Owns 7 mills, producing 600,000 MT of cane sugar
Wang Kanai (Thailand) 0.5 % of world sugar production 0.9 % of world cane sugar production		Owns four mills and produces 600,000 MT. It plans to construct another mill, to be the largest in the world, in cooperation with Nissho Iwai.
Source: UNCTAD		

ANNEX VII

Main producers' trading organizations

Trading organization	Exports, 1990	Activities
Cubazucar	7 million MT	State company, has the monopoly on Cuba's sugar exports.
South African Sugar Association	830,000 MT of raw sugar	An industry organization which has a monopoly on all sugar exports from South Africa.
CSR Ltd., Australia	3 million MT of raw sugar	A private company; it is the sole export marketing agent for the Queensland Sugar Corporation, which has a monopoly on the purchase of sugar in Queensland, Australia's main producing region.
Thai Cane and Sugar Corp	600 000 MT of raw sugar	A tripartite ownership (Government, sugar cane growers and sugar factories), it is responsible for Thailand's long-term export contracts.
Thai Sugar Trading Corp.	Over 1.2 million MT of sugar.	With 2/3 of the shares in the hands of sugar factories, 1/3 in the hands of the main cane sugar planters' association, it was responsible for 63 per cent of Thailand's C quota exports in 1990.
Mauritius Sugar Syndicate	585,000 MT.	Government agency with a monopoly on sugar traded in Mauritus: it manages all domestic and export sales.
Distribuidora Azucarera Guatemalteca	Half a million MT.	Organization of sugar millers.
Fiji Sugar Marketing Company	Close to 400,000 MT of raw sugar	All sugar and molasses produced and exported by the Fiji Sugar Corporation are marketed by the Fiji Sugar Marketing Company Ltd. (FSM), a company wholly owned by the Government. The FSM sells directly to end-users (refiners), on a c.i.f. or c.&f. basis. Brokers in New York and London are used as intermediaries to negotiate prices and tonnages. Only exports to New Zealand are f.o.b.
Copersucar, Brazil	300,000 MT of raw and white sugar	This co-operative, one of Brazil's largest sugar producers, exported 300,000 MT of raw and white sugar in 1991/92.
Ceroil, China	Approximately half a million MT of white sugar	China's food marketing company. It has a monopoly on sugar imports and is responsible for a large part of sugar exports. It trades directly, or through one of its subsidiaries, of which Top Glory (based in Hong Kong, with offices in London and New York) is the largest.
CI Azucares y Mieles SA (CIAMSA), Colombia	Over 400,000 MT, mainly raw sugar.	Some 90 per cent of Colombia's sugar exports are handled by this sugar trade company set up by the Colombian sugar mills.
Indian Sugar Industry Export and Import Corporation (ISIEC)	Over half a million MT of white sugar.	Since 1990, IESEC, a sugar industry organization, has had a monopoly on imports and exports of sugar in India.
Source: UNCTAD.		

ANNEX VIII
Main trade houses

Parent company	Subsidiary	Activities
Groupe Sucres & Denrees (Sucden), France	Sucden is active in the oil trade (which gives it an advantage for barter deals) and soft commodities (in particular cocoa, coffee and dairy products). The Sucden group used to be the world's largest soft commodity trader, but has reduced its activities in recent years. In 1990, a total of 4.8 million MT was traded, of which 2 million MT was Cuban sugar (or 28 per cent of Cuba's exports) and half a million MT was EC sugar; Thailand, Brazil and Australia were the other main sources. The USSR was the main client, with 1.5 million MT (or 42 per cent of the USSR's imports); Egypt, Algeria, Japan were other large clients. 4.5 million MT of sugar was handled in 1991.	
	Sucden Kerry, France	Sucres & Denrées has a 70 per cent share in Sucden Kerry, the sugar group Kuok (Malaysia/Hong Kong) owns the rest. Sucden Kerry is the main company trading with Cuba, closely involved in Cuba's preferential contract with Russia and giving large pre-export credits to the country. Sucden Kerry is also becoming involved in sugar production, with a joint-venture in Romania. In 1991, it also set up Sugar Trading Co Ltd., a joint-venture with Russia's largest importer, Prodintorg - Sucden owns a 33 % share.
	Amerop Sugar Corporation, USA	Responsible for US trade (including quota trade, and trade within the US - Amerop has several long-term contracts with American industries) and trade with Latin-American countries. It sold 250,000 MT of sugar to Mexico in 1990, and is the main buyer of Colombian and Argentinean sugar.
	Amerop Chile	Chile's most important sugar distributor, covering about one fifth of the Chilean market with 1990 sales of 100,000 MT. Sucden also used to have a 27 per cent share in IANSA, Chile's sugar producer, but sold its shares in 1991.
	Comfin Trading, UK	Principally active as a brokerage company for sugar exports by ACP countries in the framework of the Lomé Convention.
	Kerry International Trading (KIT), Hong Kong	KIT traded around 2 million MT of sugar in 1990 and was the main sugar trader in the Far East. KIT was also active on the Indian subcontinent. In 1991, KIT transferred its activities to Paris.
ED&F Man Ltd., UK	The Man Group is a major UK trader in sugar, coffee and cocoa - one of the three largest in each of these markets. In addition, it is active in trade in edible nuts and spices.	
	E D & F Man (Sugar) Ltd., UK	Together with Sucden, the world's largest sugar trader, with over 3 million tonnes a year, the company is also one of the three main brokers for sugar exports by ACP countries to the EC (in the framework of the Lomé Convention).
	Farr Man, USA	Responsible for trade with Central and South American producers.
Cargill, USA	One of the world's largest trading firms, with also some production interests (especially in the vegetable oils sector). Very important in the trade in cereals, vegetable oils, cotton and cocoa, and (with a yearly turnover which is increasing steadily and which is now around 3 million tonnes) among the largest sugar traders.	
Tate & Lyle Plc., UK	Tate & Lyle is, direct production and sugar refining combined, the world's largest private sugar producer.	
	Tate & Lyle International, UK	This is Tate & Lyle's independent trading organization. Particularly active in the Far East.
Czarnikow	Czarnikow is active in the trade of most soft commodities.	

Holdings, UK	Czarnikow (Sugar), UK	Czarnikow holds 65 per cent in Czarnikow (sugar), while Australian sugar exporter CSR holds 20 per cent; Berisford, which used to own British Sugar and trader JH Rayner, acquired by Czarnikow in 1991, owns the remaining 15 per cent. Czarnikow is the world's largest sugar broker, handling some 4-4.5 million MT of sugar a year, both raw and white; the company is one of the three main brokers for sugar exports by ACP countries to the EC (in the framework of the Lomé Convention).
Marc Rich, Switzerland	A multi-commodity trader, one of the world's largest in fuels and metals. The company is only active in sugar since 1990. Marc Rich has an edge in barter trade deals - after Sucden, it is the world's largest sugar barter trader.	
	Marc Rich Sugar, UK	Its total yearly turnover is around 1 million tonnes and growing. A recent oil-sugar swap, involving, among other things, the toll-refining of 400,000 tonnes of sugar in Ukraine, with Russia, figured among its largest contracts.
	Richco, USA	Responsible for operations in Latin America and the USA. Quite active in intra-Latin America trade (including toll-refining).
Bank Maracaibo, through BM-E Interfunding, Venezuela	Czarnikow-Rionda Sugar Trading Inc., USA	A specialized sugar trader, particularly active in Latin America and, through an office in Hong Kong, the Far East. Total turnover in 1992: about 1 million MT.
Gill & Duffus, Switzerland	Gill & Duffus used to be a major soft commodity trader when owned by Dalgetty PLC; when sold and broken up in 1989, the sugar division was bought by a consortium of Taiyo Gyogyo Kabushike Kaisha (Taiyo Fisheries; 40 %), one of Japan's major sugar refinery companies, Daitoh Trading Company (20 %), and its management. The company is now mainly active as a broker, and particularly serves some of Cuba's sugar exporters.	
Nissho Iwai, Japan	Nissho Iwai is Japan's 3rd largest sugar refiner and a large HFCS producer. It has a share of 0.16% in Kenana Sugar Co. Ltd, Sudan's only private sugar grower/milling company; in exchange, it has this company's exclusive marketing rights. It is also investing in a very large sugar mill in Thailand in a joint-venture with one of Thailand's main sugar producers. It is one of the main buyers of South-African sugar. In the period of 1987-1991, it was one of the companies which had a share in Thailand's long-term export quota, i.e. some 150,000 MT/year. In 1992, it traded some 670,000 MT of raw sugar and 30,000 MT of white sugar.	
Mitsui, Japan	With 3 refineries, Mitsui is Japan's largest sugar refiner. It controls three sugar mills in Thailand and has a 3.7 per cent share in the Royal Swaziland Corp., Ltd). Mitsui's sugar trade turnover in 1991 was approximately 575,000 MT, three-quarters of which were destined for Japan. Mitsui, through one of its subsidiaries (Mitsiam), is the largest buyer of Thai sugar and is one of the main buyers of Australian sugar.	
Mitsubishi (Japan)	Mitsubishi is also Japan's second largest sugar refiner. Together with Mitsiam, it is the main buyer of Australian sugar.	
Itochu Corp., Japan	Itochu (formerly known as C. Itoh & Co.) is Japan's fourth largest sugar refiner and trades around 600,000 tonnes of sugar a year. It is one of the three main buyers of South African sugar.	
Marubeni, Japan	Marubeni is one of Japan's sugar refiners. It is one of the three main buyers of South African sugar. The company is also active as a broker for EC and US quota sugar.	
Jean Lion, France	Jean Lion, a sugar trader concentrating on a number of niche markets (among others in Northern Africa and the Middle East), trades around 1 million tonnes of sugar a year. It is one of the companies which controlled a part of Thailand's long-term export quota, over 150,000 MT/year.	
Louis Dreyfus, France	A large trader in soft commodities and active in financial services as well. Its sugar transactions amount to between half a million and one million tonnes a year, concentrated on a few niche markets, including Russia (Dreyfus is a partner in one of Russia's main sugar import organizations).	
Kuok Group, Hong Kong	The Kuok group has a 30 per cent share in Sucden and is a large sugar trader in its own right. It also has interests in sugar production - it is Malaysia's largest producer with a 60,000 ha sugarcane estate and a 500,000 MT/year refinery. In Indonesia it owns a plantation and a mill. It also owns a large sugar fleet.	

André & Co (Switzerland)	A large trader in soft commodities, with a sugar-trading department.	
VITOL (USA)	VITOL Sugar (UK)	VITOL Sugar, created in 1992 as a subsidary of VITOL, one of the major independent oil trading companies, specializes in oil-sugar swaps; in the first months of its existence, it did swaps for some 300,000 MT of sugar.
Südzucker (Germany)	Südzucker is Europe's second largest sugar producer.	
	Hottlet Sugar Trading N.V. (Belgium)	Hottlet exports, on a yearly basis, some 250,000 MT of white sugar (mainly sugar produced by Südzucker) outside the EEC.
Golodetz, USA	No information.	
Source: UNCTAD secretariat.		

ANNEX IX

Percentage of ACP sugar exports to the European Community in 1990
(tonnes raw value)

ACP Countries	Total export	Exports to EEC	Import of white sugar	Percentage of EEC export in total export
Barbados	59,319	55,882	-	94.21
Belize	98,074	44,238	-	45.11
Congo	23,000[a]	11,000	3,000	47.82
Côte d'Ivoire	32,000[a]	22,000	1,000	68.75
Fiji	399,128	158,953	-	39.83
Guyana	133,823	133,823	-	100.00
India[b]	46,462	10,804	-	23.25
Jamaica	148,786	131,414	46,761	88.32
Kenya	0	0	89,000	-
Madagascar	41,317	11,343	-	27.45
Malawi	67,335	30,383	-	45.12
Mauritius	612,179	545,673	-	89.14
St. Kitts and Nevis	22,000[a]	15,000	-	68.18
Swaziland	441,322	152,039	-	34.45
Tanzania	22,000[c]	1,000	8,000	4.55[d]
Trinidad and Tobago	64,410	46,610	-	72.36
Zimbabwe	246,435	102,942	-	41.77

Source: ISO Sugar Yearbook 1990
a: Reported by countries of destination
b: India is not an ACP country, but it is granted a similar regime
c: Reported by EEC
d: in 1989, 90.90%

ANNEX X
United states sugar import quotas
1990/91
(Short tonnes raw value)

Countries	Import quotas	GSP[a]	CBI[b]
Argentina	96 417	*	
Barbados	15 696	*	*
Bolivia	17 938	*	
Brazil	325 127	*	
Colombia	53 814	*	
Costa Rica	33 633	*	*
Dominican Republic	394 634	*	*
Ecuador	24 665	*	
El Salvador	58 298	*	*
Guatemala	107 269	*	*
Guyana	26 907		*
Haiti	8 851	*	*
Honduras	22 423	*	*
Jamaica	24 665	*	*
Mexico	8 851	*	
Nicaragua	47 087		
Panama	65 026		
Peru	91 933	*	
Trinidad and Tobago	15 696	*	*
Uruguay	8 851	*	
Australia	186 107		
Belize	24 665	*	*
Canada	-		*
Congo	8 851	*	
Ivory Coast	8 851	*	
Fiji	20 180	*	
Philippines	354 276	*	
Gabon	8 851		
India	17 938	*	
Malawi	22 423	*	
Malagasy	8 851		
Mauritius	26 907	*	*
Mozambique	29 149	*	
Papua New Guinea	8 851	*	
Paraguay	8 851		
Swaziland	35 877	*	
South Africa	0		
San Kitts-Nevis	8 851	*	*
Thailand	31 391	*	

Taiwan (province of China)	26 907	*	
Zimbabwe	26 907	*	
Total	2 312 825		

Source: GEPLACEA, USDA

a The GSP regulations have been extended in 1985 for a period of 8.5 years, and may expire in 1983.

b. CBI was signed in August 1983

ANNEX XI

Share of sugar products in developing countries' total exports

	1967-71	1979-81	1987-89
1. Cuba	76	81	71
2. Fiji	56.3	54	41
3. St Kitts and Nevis	NA	55	40
4. Mauritius	87.6	63	35
5. Guyana	27.3	31	33
6. Belize	NA	36	31
7. Dominican Rep.	51.1	33	17
8. Barbados	41.4	19	16
9. Malawi	0.4	17	10
10. Jamaica	13.7	6	9
11. Guatemala	3.5	5	7
12. Mozambique	12.0	NA	5
13. Trinidad Tobago	4.6	1	2
14. Panama ex.zn	5.3	15	NA
Source: UNCTAD secretariat estimates			

Notes

1. Main types of white sugar

Types of white	Polarisation	Ash	Moisture	Colour
Refined, EEC No.1	99.9	0.0108	0.04	15
Refined, EEC No.2	99.7/99.8	0.027	0.06	45
Crystals	99.7	-	0.05	60
Washed whites	99.5	-	0.10	60
Plantation whites	99.5	-	0.10	60
Source: GEPLACEA handbook on international sugar marketing.				

2. ISO Quarterly market review, October 1993.

3. Recently, some developed countries have started to produce ethanol from sugar beet, partly in reaction to a reduction of government support to white sugar production. See D. Buchan, "France samples home-grown petrol", *Financial Times*, 15 July 1993.

4. World Bank, the International Sugar Industry, 1987; Copersucar, 1992.

5. Brazil's ethanol production in the late 1980s was at a cost of approximately US $ 38/barrel. Since the mid-1970s, production costs could be reduced by an average of 3.8 per cent a year, it is estimated that by the mid-1990s, production costs of US $ 32/barrel will be attained. Taking into account ethanol's somewhat higher energy content, this would be competitive with gasoline sold at US $ 31/barrel.

6. Survey carried out by Copersucar.

7. Some of the initial polluting effects connected with ethanol production have been resolved in Brazil's Alcohol Programme; stillage for example, a residue, which formerly caused great water pollution, is now spread as a crop fertilizer and can also be used to produce methane gas for energy generation.

8. This calculation is based on the following formula: $1/N \sum_{t=1} [(|Y-Yt|)/Yt]$ where Yt is the observed magnitude of the variable; Y-Yt is the magnitude estimated by fitting an exponential trend to the observed value and N is the number of observations. The vertical bar indicates the absolute value (i.e. disregarding signs). See UNCTAD Commodity Yearbook, 1991 and 1992.

9. A large deal was struck in that regard in 1992, involving a strong role for Marc Rich, one of the main sugar trading companies, and rather complicated arrangements. It is not clear whether this type of deal will be easy to repeat in the future.

10. *Financial Times*, 4 November 1993.

11. Agricultural Trade Policy Simulation Model (ATPSM), UNCTAD/UNDP, July 1992.

12. Ron Lord and Robert D. Barry, *The World Sugar Market-Government Intervention and Multilateral Policy Reform*, United States Department of Agriculture, September 1990.

13. The loans are non-recourse because the Government has no option but to accept forfeiture as full satisfaction of the loan obligation, regardless of the price of sugar at the time of default.

14. Reuter, 17 May 1993.

15. Ejner Stendevad, Head of the Sugar Division, Commission of the European Communities, London, 24 September 1992.

16. Idem.

17. In 1987, for example, the price was the equivalent of 38.7 cents a pound in transferable rubles for Cuban sugar (above 800 US $ /tm) during a year when the world price average was 6.7 cent a pound. In 1991, the price was about 288 US $/mt.

18. Lowest-cost producers are all cane producers, except Chile. In relative ranking, and approximate index of costs: Zimbabwe (cheapest: 100); Malawi (103); Chile (112); Zambia (116); Swaziland (119); Colombia (121); Thailand (122); South Africa (123); Kenya (124); Australia (126).

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THE WORLD LEAD MARKET IN THE 1990s:

A REVIEW OF DEVELOPMENTS

Report by the UNCTAD secretariat

GE. 94-50351

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Summary and conclusions

1. The world lead market has recently been largely a buyers' market. This was due to a number of factors, including the economic recession in industrialized countries, an abundant availability of material, more stringent anti-lead legislation for health and environmental protection, further progress in scrap recycling, increased exports from countries of Eastern Europe and reduced imports by China.

2. Following falls of 4.4 per cent in 1990 and 3.5 per cent in 1991, total world consumption of refined lead was steadier in 1992, totalling 5,389 thousand metric tons, virtually unchanged from the previous year. Preliminary estimates for 1993 indicate a modest increase in consumption. While consumption declined in developed market economy countries, it has shown steady growth in developing countries including China for most of the recent years.

3. Supply of refined lead experienced a modest recovery in 1992 after falls in the two preceding years. This was due to an increase in the proportion of recycled scrap (secondary lead). World mine production amounted to 3,166 thousand metric tons in 1992, down 5.2 per cent from 1991.

4. Commercial stocks increased substantially. The material held in London Metal Exchange (LME) warehouses climbed from 23.4 thousand metric tons at year-end 1989 to 261.8 thousand metric tons in mid-1993. The increase in LME stocks would seem to have originated mainly from countries of Eastern Europe. Country stocks (producers', consumers' and traders' stocks) rose by nearly 20 per cent, to attain 405.7 thousand metric tons during the same period.

5. It is estimated that in 1992 world exports of refined lead were down 1.5 per cent, to 1,380 thousand metric tons, while world imports were down by 2.7 per cent, to 1,450 thousand metric tons. Recent developments included shifts in the trade of countries of Eastern Europe which emerged as substantial net exporters instead of net importers as in the past, and the expansion of domestic production in China, which ceased to import refined lead and became a net exporter of the metal instead.

6. Lead ore accounted for 35 to 40 per cent of the international trade in lead (not including scrap). In 1992, the estimated world exports of lead ore were down 3.6 per cent, to 800 thousand metric tons, while world imports were up 1.3 per cent, to 880 thousand metric tons. The rise in imports was presumed to arise from an increase of material shipped to Eastern Europe for toll conversion.

7. Prices of refined lead began to fall in 1991 as a result of the downturn in industrial activity in developed market economies and economies in transition. Since the beginning of 1993 to the time of writing, prices of refined lead had fallen by 14.5 per cent, down to $US 388 per metric ton. LME prices averaged $US 811 per metric ton in 1990, $US 558 per metric ton in 1991 and $US 542 per metric ton in 1992.

8. With recent forecasts pointing to lower consumption in 1993, there is unlikely to be any significant improvement in the short-term outlook of the lead market, which would continue to be affected by an abundance of material and the overhang of substantial stocks. In the longer-term, prospects would improve if industrial activity strengthened as a result of a recovery in world economic conditions. Demand for lead would be further strengthened by greater growth of consumption in the developing countries, particularly the eastern Pacific Rim countries, as their per capita consumption of refined lead rises from the current low level of less than 8 per cent of the developed market economy country level of consumption.

9. Nevertheless, lead faces the challenge of a growing number of negative factors, including the concern about environmental pollution, the increasing use of lead-free batteries and decreasing demand for lead as additives in motor vehicle fuel. Any future improvement in the lead market is likely to be constrained by such developments.

I. DEVELOPMENTS IN DEMAND

10. Demand for lead in a number of consuming countries has become steadier as industrial activity[1] begins its recovery from the recent recession. By country, the largest consumer of refined lead remains the United States, with the Russian Federation ranking second despite recent cutbacks in consumption, followed by Germany and Japan. There are otherwise great differences in demand performance by region and by country.

11. In 1992, total world consumption of refined lead decreased by barely 0.1 per cent to 5,389 thousand metric tons, compared to falls of 4.4 per cent and 3.5 per cent, respectively, in 1990 and 1991 (annex 1). The 1992 decrease occurred solely in developed market economy countries where consumption fell for the third consecutive year from a peak of 3,578 thousand metric tons in 1989. Preliminary estimates indicate a slight increase in consumption of refined lead in 1993 as a result of stronger demand in some important consuming countries, including the United States.[2]

12. Notwithstanding the absolute decline of consumption in the developed market economy countries, their share has remained at over 63 per cent of world demand for refined lead in the last three years. In 1992, consumption remained relatively stable in Germany, the United Kingdom and the United States while it fell in France (2.6 per cent), Italy (4.6 per cent) and Japan (4.8 per cent). These six countries accounted for 83 per cent of the developed market economy country consumption.

13. Consumption in developing countries has showed greater strength than in developed market economy countries. In 1992, it rose to an all-time peak of 980 thousand metric tons, compared to 918 thousand metric tons in 1991. Despite the world economic slowdown of the early 1980s and the 1990s, consumption of refined lead in developing countries grew, on average, at about 4.0 per cent per annum between 1980-1992. However, their per capita consumption of refined lead is still very low, at less than 8 per cent that of the developed market economy countries, which currently exceeds 4 kg per capita. The 1992 increase occurred mainly in Mexico which was the largest consuming country among the developing countries, excluding China. Conversely, consumption fell in both the Republic of Korea and Taiwan Province of China, which were the second and the third largest consumers in the developing world.

14. Demand in countries of Eastern Europe has been seriously affected by sharp falls in industrial activity following recent economic and structural reform. In 1992, their total consumption of refined lead was estimated at 721 thousand metric tons, for the fifth consecutive fall since 1987 when it was estimated at 1,173 thousand metric tons. Lower demand in these countries was accounted for principally by the fall in the consumption of the Russian Federation, recently estimated at only 600 thousand metric tons, compared to 775 thousand metric tons in 1987. Demand in the other countries of Eastern Europe (Bulgaria, the Czech Republic, Poland, Romania and Slovakia) was even more severely curtailed, leading to a decrease of consumption from 279 thousand metric tons to 107 thousand metric tons over the same period.

15. With the rapid expansion of industrial activity in an economy growing at an average rate of 8 to 9 per cent per annum in the 1980s, demand for lead in China has expanded rapidly in recent years. Consumption of refined lead is currently estimated at 250 thousand metric tons. The potential for further growth in consumption is high, given that Chinese per capita consumption is even lower than that of other developing countries.

II. DEVELOPMENTS IN SUPPLY

16. Supply of refined lead experienced a modest recovery in 1992, up 1.0 per cent to 5,612 thousand metric tons following falls of 4.3 per cent and 2.5 per cent, respectively, in 1990 and 1991 (annex I). The sources of refined lead are mine production (primary lead) and recycled scrap (secondary lead).

17. In recent years, the proportion of the latter has been on the rise, largely as a result of the greater efforts made in the developed market economy countries to recycle lead scrap spurred by new environmental regulations. Mine production currently accounts on average for less than 60 per cent of total world lead production compared to 65 per cent in the early 1980s. This proportion is expected to continue to decline in the future.

A. Mine production

18. In 1992, world mine production was estimated to have gone down by 5.2 per cent, to 3,166 thousand metric tons. This was 12 per cent below the peak of 1985 (annex I). Mine production has been affected by a number of factors, including unfavourable price conditions and increased scrap recycling which has reduced consumption of lead ore.

19. Developed market economy country mine production still accounts for 50 per cent of the world output of lead ore although this proportion has been falling in recent years. In 1992, mine production in the developed market economy countries was down 5.2 per cent to an estimated amount of 1,580 thousand metric tons. The fall, which occurred principally in Germany, Greece, Spain and the United States, was partly compensated by increases in Canada, Ireland, Italy and Sweden.

20. Mine production in developing countries is estimated to have gone down by 6.5 per cent, to 661 thousand metric tons in 1992. The decline occurred chiefly in ex-Yugoslavia owing to the difficulties resulting from the on-going war. Production also fell in Argentina, Iran (Islamic Republic of), Myanmar, Peru, Thailand, Turkey and Zambia, but this was largely compensated by increases in India, Namibia, Mexico and the Republic of Korea. The largest producers among the developing countries were Peru, Mexico and Morocco, which together accounted for about two-thirds of developing country production.

21. As in most other mineral and metal sectors, production of lead ore in countries of Eastern Europe has been in decline since 1985. However, the decline would seem to be

levelling off and mine production was estimated at 568 thousand metric tons in 1992 (virtually unchanged from the 1991 level). The Russian Federation accounted for 460 thousand metric tons in 1992, compared to 520 thousand metric tons before the successive cutbacks in 1990 and 1991. In the rest of Eastern Europe. production in 1992 showed recovery in Poland and Romania but decline in Bulgaria, the Czech Republic and Slovakia.

22. China accounts for between 9.0 and 10.0 per cent of world mine production. Like most other other mineral and metal sectors, production rose for most of the 1980s and reached a peak of 341 metric tons in 1989. But unfavourable market conditions, limited reserves and infrastructural constraints have affected further expansion more recently. In 1992, Chinese ore production dropped by 10.3 per cent, to 287 thousand metric tons.

B. Scrap recycling

23. Scrap recycling continues to benefit from anti-pollution legislation enacted in many countries for the protection of the environment. Room for further improvement in such legislation was recently reported to exist.[3]

24. However, the increase in scrap recycling is likely to slow down in the future as most of the recuperable scrap is already being collected for recycling in the developed market economy countries. The rate of recovery of lead scrap from used lead-acid batteries has now attained a very high level in major consuming countries, for example exceeding over 97 per cent in the United States recently. Furthermore, in many applications lead is dissipated, which makes scrap recovery expensive and often impossible. Scrap recycling could, nevertheless, be expected to continue expanding in countries of Eastern Europe and developing countries including China.

25. In 1992, secondary refined production in market economy countries was down 1.5 per cent to 2,174 thousand metric tons. Production has recently been equal, on average, to 51 per cent of the consumption of refined lead metal in these countries, compared to 43 per cent in the early 1980s. However, the progress in scrap recycling has occurred largely in developed market economy countries where secondary production as a proportion of their refined-lead consumption has increased to 54 per cent from 45 per cent during the same period. In contrast, the proportion has only increased to 37 per cent from 35 per cent in the developing countries.

26. Among the developed market economy countries, the major producers of secondary refined lead are the United States, Germany, France, United Kingdom, Japan and Canada,

which together account for almost 85 per cent of the developed market economy production. Secondary refined lead production has grown strongly in Canada, France and the United States but has declined substantially in Japan and the United Kingdom.

27. In the developing countries, the development of recycling facilities has been greatly hampered by the small amount of scrap generated by domestic consumption and the greater lassitude with regard to environmental protection. The major producing countries are Mexico and Brazil, which together accounted for 38 per cent of the secondary refined lead production in 1992. The other significant producers are India, Malaysia and the Republic of Korea, where domestic lead-consuming industries, such as automotive and electronic, have been expanding rapidly.

C. Stock movements

28. Material held in stocks has remained at a substantial level in recent years (annex II) mainly as a result of the fall in demand following the recession in industry and the increase in supply from surplus shipments from the countries of Eastern Europe. Since the drawdowns during the strong market demand of 1988-1989, commercial stocks, including London Metal Exchange (LME) and country stocks, have continued to accumulate. By mid-1993, the material held in such stocks amounted to 653 thousand metric tons, a rise of 80.2 per cent since 1989.

29. The recent rise has been due largely to the increase of LME stocks which rose from 23.4 thousand metric tons in 1989 to 261.8 thousand metric tons in mid-1993. This increase has largely resulted from the build-up of material in Italian warehouses that presumably originated from Eastern Europe. LME stocks, mostly held in the hands of traders, show greater fluctuations as market conditions shift.

30. Country stocks, including producers', consumers' and merchants' stocks, have also risen substantially in recent years to reach 405.7 thousand metric tons in 1992, from 338.8 thousand metric tons in 1989. Despite a limited drawdown in 1993, the material held in such stocks still remains substantial. The country stocks were made up largely of material accumulated in the hand of producers as 'involuntary' stocks in the face of deteriorating market prices. Producers' stocks amounted to 165.9 thousand metric tons in 1991, 205.5 thousand metric tons in 1992 and 243.9 thousand metric tons in 1993 (at mid-year).

31. As regards consumers' stocks, the level depends on economic conditions since they are largely working stocks whose size is a function of the consumers' level of activity. Consumers'

stocks amounted to 154.7 thousand metric tons in mid-1993, compared to 150.6 thousand metric tons at end-1992 and 154.4 thousand metric tons at end-1991. Such stocks are likely to need replenishment once economic activity turns around.

III. DEVELOPMENTS IN TRADE

A. Trade in refined lead

32. International trade in refined lead consists mostly of intra-regional trade, conducted principally among developed market economy countries. Of the current total yearly production, only about one-fourth enters the world market as exports and the rest of the production is consumed domestically.

33. In 1992, estimated world exports of refined lead went down by 1.5 per cent to 1,380 thousand metric tons (annex III), which was lower than both in 1990 and 1991 but higher than in 1989. However, the performance of exports varied greatly among exporting countries. Exports of refined lead decreased in Germany, the Netherlands and the United States, and increased in Australia, Canada, France and Mexico, although the increases in the latter countries were not sufficient to offset the decreases in the former countries. The largest exporters of refined lead were Australia, Canada and Mexico.

34. In 1992, world imports of refined lead fell by 2.7 per cent to an estimated 1,450 thousand metric tons. Imports of refined lead decreased chiefly in Japan, the Republic of Korea and the United Kingdom, but rose in Spain, Taiwan Province of China and the United States. Developing country imports of refined lead have shown strong upward trends recently, largely as a result of growing demand in East and South-East Asian countries.

35. Major shifts also occurred in the trade of countries of Eastern Europe. Before the recent political and economic changes, these countries had been net importers of refined lead but since then the flow has been reversed. In 1992, the countries of Eastern Europe were net exporters, exporting 96 thousand metric tons and importing only 20 thousand metric tons; the figures for 1991 were exports 70 thousand metric tons and imports 40 thousand metric tons.

36. As regards China, the mining capacities which have recently come on stream have led to a sharp fall in its imports while its exports have increased. In 1992, it exported 73 thousand metric tons while its imports dropped to below one thousand metric tons.

B. Trade in lead ore

37. Lead ore accounts for about 35 to 40 per cent of the international trade in lead (not including scrap). Preliminary estimates show that world exports of lead ore decreased by some 3.6 per cent to around 800 thousand metric tons in 1992 (annex III). The developed market economy countries accounted for more than 60 per cent of the export trade in lead ore, a substantial part of which consisted of intra-regional trade such as the trade between countries of the European Union and North America. Developed market economy country exports were estimated at 510 thousand metric tons, compared to 550 thousand metric tons in 1991 and 745 thousand metric tons in 1990. The largest exporters were Canada, Australia and the United States.

38. The weak demand in the export market and expansion of domestic smelting capacity have greatly affected exports from developing countries recently. Developing country exports dropped successively to 316 thousand metric tons in 1990 and 273 thousand metric tons in 1991 from the peak of 355 thousand metric tons in 1989. Estimates indicate that developing country ore exports in 1992 remained unchanged, at around the 1991 level. The largest exporters were Peru, Bolivia and Argentina, which accounted for over 80 per cent of developing country exports.

39. Currently more than 90 per cent of the trade volume in lead ore is shipped to the developed market economy countries, with Japan, the United States, Germany and France being largest importers. Estimates put world imports of lead ores in 1992 at 880 thousand metric tons, an increase of 1.3 per cent, after falling by 16.2 per cent in 1991. The 1992 increase was due mainly to the rise of imports into the Russian Federation where the recent economic reform and restructuring have led to the availability of smelting capacities for toll conversion. This development reversed the decline in the role played by countries of Eastern Europe in the trade of lead ore, which had been affected by the disruption of demand that had sharply reduced ore imports into these countries between 1988 and 1991.

40. Developing country ore imports have remained small and confined mainly to the limited amounts imported by Brazil, India and the Republic of Korea. As regards China, it has played only a marginal role in the trade of lead ore. The quantities of both Chinese exports and imports have been negligible.

IV. DEVELOPMENTS IN LEAD PRICES

41. The recent price behaviour of refined lead has been strongly influenced by world economic conditions. Between 1986 and 1990, the strong performance of the world economies led to prices of refined lead on the London Metal Exchange (LME) virtually doubling, from an annual average of $US 406 per metric ton to an annual average of $US 811 per metric ton or, for a growth rate of 18.9 per cent per annum on average (annex IV). Since, the market has been weakened by falling consumption, shipments from the Russian Federation and China, and the overhang of accumulated stocks. The price gains made in the 1986-1990 years were lost as LME prices plunged from their 1990 highs to below $US 400 per metric tons recently.

42. The lead market entered 1991 with lead metal prices still staying over $US 600 per metric ton. However, the lower buying interest and an abundant availability of materials rendered lead prices unsustainable at that level. The price decline continued into 1992 as the world economy plunged into recession. Even though demand remained strong in developing countries, the price of refined lead continued weakening until the second quarter of the year when a recovery, mainly in the United States, pushed prices back to above the $US 600 per metric ton level; this level was sustained until the third quarter, when the hope for early economic upturns in the world major economies looked more remote and the price decline greatly accelerated as the market entered 1993. Lead prices have fallen by 14.5 per cent since the beginning of the year to reach $US 388 per metric ton at the time of writing.

43. The price of lead ore has only an indirect link with refined lead prices. It generally depends on conversion charges plus penalties depending on ore quality, which are fixed by smelters for converting lead ore into refined lead. The price difference between lead ore and refined lead could vary quite substantially from one period to another as charges are seldom fixed in relation to refined lead prices. On the basis of Metal Bulletin quotes, conversion charges stayed unchanged, between $US 130 and $US 140 per metric tons during 1988-1990, while prices of refined lead rose sharply as noted above. The conversion charges were increased in July 1991 to between $US 150 and $US 160 per metric tons when prices of refined lead had already begun to weaken. Despite further weakening of refined lead prices, another rise in May 1992 brought conversion charges to between $US 170 and $US 180 per metric ton, where they subsequently stayed.

V. CONCLUSIONS

44. With recent forecasts indicating lower lead consumption in 1993, immediate and short-term prospects for substantial recovery look remote in the lead market, which is still affected by an abundance of material and the overhang of substantial stocks. Consumption of lead is strongly dependent on industrial activity. Recovery has been slow following the recession in 1991-1992, particularly in Japan and Western Europe.

45. In the longer term, demand for lead would improve with strengthened economic growth rates in the major world economies, which are forecast to rise in 1994 and 1995. The economic decline in the countries of Eastern Europe is likely to touch bottom and possibly be reversed. As has been seen in the past, the return to a higher industrial activity in these countries would have a beneficial effect on consumption and improve imports of lead. Demand for lead is likely to be further strengthened by continued growth of consumption in developing countries, including China. As industrial activity expands in these countries, their per capita consumption of lead is expected to rise from its current very low level, which is still less than 8 per cent of the per capita consumption in the developed market economy countries.

46. However, the lead industry will also be facing the challenge of a number of negative factors. Lead demand will probably continue to be affected by more stringent legislative measures that are likely to be taken against pollutants for health and environmental protection and by substitution of other materials for lead in many applications, such as the substitution of cadmium batteries for lead-acid batteries. As lead-acid batteries account for over 60 per cent of total lead consumption, any market inroads made by lead-free batteries would have a major impact on lead demand. Further inroads into lead consumption may also be expected from lead-free petrol in substitution for lead-additive petrol, as the number of motor vehicles equipped with catalysers continues to rise.

47. On the supply side, the level of material held in stock could have reached a ceiling following recent increases. A demand recovery is likely to entrain a drawdown of producers' and LME stocks while it strengthens consumers' demand for stock replenishments. As regards mine production, it has been in decline in recent years. While some levelling off from further decline may be expected, there will probably not be an upsurge of production in the near future, unless lead prices rise sharply, an unlikely event in terms of the present market outlook. On the other hand, recycled lead will probably continue its recent rise, to account for an increasing proportion of lead supply on the market.

48. In conclusion, an improvement in the lead market may be expected through a better balance between demand and supply in the longer run rather than in the shorter term. However, such improvement is likely to be limited by a number of factors, including an increase of stringent legislation against pollutants including lead, diminishing demand for lead in a number of applications as a result of technological advance and substitution, and further progress in the collection and recycling of lead scrap.

Notes

1. On average, a change of 1.0 per cent in industrial production brings a change in lead consumption of between 0.3 per cent and 1.0 per cent in most countries (see Rolf Boehnke, "What future for lead" Monthly Metal Bulletin, May 1993).

2. According to the press release of the International Lead and Zinc Study Group (dated 19 October 1993), consumption of lead during 1993 was expected to be about 1.0 per cent less than in 1992.

3. According to a Lead and Zinc Study Group (LZSG) report, there is room for legislative improvement with regard to lead-acid batteries in the countries of the European Union (see LZSG Report on the Progress of Work of the Statistical Committee, LZ/STAT.9322, 8 November 1993).

Annex I

World consumption and production of refined lead and mine production of lead by region, 1984-1992

(Thousand metric tons of metal content)

	1984	1985	1986	1987	1988	1989	1990	1991	1992
A. World consumption of refined lead	5,400	5,438	5,539	5,655	5,776	5,844	5,586	5,393	5,389
Developed market economy countries	3,282	3,240	3,277	3,327	3,427	3,578	3,560	3,466	3,398
Developing countries	665	768	828	871	921	944	834	918	980
Countries of Eastern Europe	1,202	1,162	1,160	1,173	1,148	1,037	904	719	721
Socialist countries of Asia	251	268	274	284	280	285	288	290	290
B. World production of refined lead	5,400	5,469	5,488	5,654	5,858	5,952	5,695	5,554	5,612
Developed market economy countries	3,254	3,185	3,183	3,296	3,470	3,577	3,523	3,521	3,466
Developing countries	699	812	870	908	980	966	869	860	924
Countries of Eastern Europe	1,205	1,227	1,185	1,166	1,197	1,037	951	812	815
Socialist countries of Asia	242	245	250	284	311	372	352	361	407
C. Mine production of lead	3,434	3,588	3,368	3,425	3,388	3,332	3,369	3,341	3,166
Developed market economy countries	1,544	1,650	1,579	1,651	1,622	1,548	1,650	1,667	1,580
Developing countries	871	901	816	771	712	742	725	707	661
Countries of Eastern Europe	726	726	661	646	653	621	608	567	568
Socialist countries of Asia	293	311	312	357	401	421	386	400	357

Source: UNCTAD Commodity Yearbook, UNCTAD, Lead and Zinc Statistics, the monthly bulletin of the International Lead and Zinc Study Group; and World Metal Statistics published by World Bureau of Metal Statistics.

Annex II

World stocks of lead as at year-end, 1986-1993 a/
(Thousand metric tons of metal content)

	1986	1987	1988	1989	1990	1991	1992	1993a/
METAL EXCHANGE STOCK								
London Metal Exchange								
Belgium	7.3	2.4	13.4	0.2	3.1	14.7	17.7	19.6
France	-	0.3	2.9	0.5	0.3	-	-	-
Germany	-	1.0	6.4	0.3	1.0	3.5	4.9	5.4
Italy	0.9	9.4	19.7	6.5	1.4	13.5	12.0	19.1
Neth...lands	8.4	2.4	18.7	4.4	30.4	82.4	130.0	159.9
Sweden	2.7	0.6	0.5	0.5	0.4	1.6	16.2	29.6
United Kingdom	18.5	2.8	-	11.0	12.1	8.0	9.0	10.9
Singapore	-	-	-	-	8.0	2.5	22.9	13.3
U.S.A.	-	-	-	-	-	0.3	-	-
Total	37.8	18.9	61.6	23.4	56.7	126.5	212.7	261.8
COUNTRY STOCKS								
Germany								
at Producers	27.8	49.0	27.8	30.8	24.6	30.4	31.8	39.5
at Merchants	1.4	1.3	1.2	0.4	0.2	0.2	0.5	0.2
at Consumers	30.9	22.0	16.4	20.3	20.2	23.7	23.0	19.9
Total	60.1	72.3	45.4	51.5	45.0	54.3	55.3	59.6
United Kingdom	28.3	24.4	26.7	25.7	22.3	21.8	24.5	26.1
Other Europe								
at Producers	61.3	44.7	68.1	45.9	41.8	60.4	70.9	86.9
at Consumers	24.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Total	85.3	65.7	89.1	66.9	62.8	81.4	91.9	107.9
Japan								
at Producers	12.7	7.7	8.9	7.4	6.1	8.5	17.4	19.1
at Merchants	1.9	2.3	2.4	2.2	1.0	1.6	3.8	0.9
at Consumers	21.3	15.7	19.9	19.1	19.1	20.7	19.5	23.9
Total	35.9	25.7	31.2	28.7	26.2	30.8	40.7	49.9
Canada	12.4	14.0	17.0	17.2	8.1	10.7	13.3	11.3
U.S.A.								
at Producers	20.4	21.6	15.4	15.6	25.5	9.1	20.5	32.2
at Consumers	78.0	83.2	85.0	78.6	81.0	67.2	62.6	50.3
Total	98.4	104.8	100.4	94.2	106.5	76.3	83.1	82.5
Brazil	0.4	1.5	4.2	0.5	2.9	..	..	..
Australia	35.6	69.1	28.4	35.8	32.2	26.3	20.5	22.7
Other Countries	4.6	4.5	0.8	18.3	20.0	20.5	31.0	31.0
Total Country Stocks	363.8	364.0	343.2	338.8	326.1	322.2	360.4	405.7
of which:								
at Producers	175.2	212.1	170.6	171.5	161.3	165.9	205.5	243.9
at Merchants	3.3	3.6	3.6	2.6	1.2	1.9	4.3	7.1
at Consumers	185.3	148.3	169.0	164.7	163.6	154.4	150.6	154.7
Total Commercial Stocks	398.8	400.9	404.8	362.2	382.7	448.6	573.0	652.8
STRATEGIC STOCKPILES								
U.S.A.	542.2	545.2	545.2	545.3	545.3	545.3	545.3	545.3

Source: World Metal Statistics, published by World Bureau of Metal Statistics.
a/ as at the end of June 1993

Annex III

International trade in refined lead and lead ore by region, 1984-1992
(Thousand metric tons of metal content)

	1984	1985	1986	1987	1988	1989	1990	1991	1992 a/
A. Refined lead									
World exports	1,338	1,335	1,333	1,340	1,434	1,312	1,413	1,401	1,380
Developed market economy countries	1,001	958	933	937	1,044	894	955	1,001	...
Developing countries	265	309	311	286	302	321	319	294	...
Countries of Eastern Europe	49	50	61	70	56	70	81	70	...
Socialist countries of Asia	23	18	28	47	32	27	58	36	...
World imports	1,346	1,357	1,377	1,353	1,354	1,379	1,635	1,491	1,450
Developed market economy countries	1,000	962	990	934	952	947	1,124	976	...
Developing countries	215	253	265	331	307	332	434	471	...
Countries of Eastern Europe	127	135	110	76	85	63	74	40	...
Socialist countries of Asia	4	7	12	12	10	37	3	4	...
B. Lead ore									
World exports	700	669	749	942	869	873	1,064	830	800
Developed market economy countries	380	380	444	525	489	495	745	550	...
Developing countries	315	280	294	334	317	355	316	273	...
Countries of Eastern Europe	4	4	4	3	3	3	-	-	-
Socialist countries of Asia	1	5	7	80	60	20	3	7	...
World imports	646	693	708	924	982	1,008	1,037	869	880
Developed market economy countries	566	601	621	828	919	930	966	813	...
Developing countries	18	24	32	42	44	49	57	46	...
Countries of Eastern Europe	57	61	49	50	19	29	11	10	...
Socialist countries of Asia	5	7	6	4	-	-	3	-	-

Source: UNCTAD Commodity Yearbook; Lead and Zinc Statistics, the monthly bulletin of the International Lead and Zinc Study Group; and World Metal Statistics, published by World Bureau of Metal Statistics.

a/ Estimates

Annex IV

Prices of refined lead, 1980-1992
(London Metal Exchange, cash settlement)

Year	US dollars per metric ton (annual average)
1980	907
1981	727
1982	546
1983	425
1984	443
1985	391
1986	406
1987	597
1988	656
1989	673
1990	811
1991	558
1992	542

Source: UNCTAD monthly commodity price bulletin, recent issues.